REGION 5 RAC2

REMEDIAL ACTION CONTRACT FOR

Remedial, Enforcement Oversight, and
Non-Time Critical Removal Activities at Sites of Release or
Threatened Release of Hazardous Substances in Region 5

FINAL
FIELD SAMPLING PLAN
Old American Zinc Plant Superfund Site,
Fairmont City
St. Clair County, Illinois
Remedial Design
WA No. 224-RDRD-B5A1/Contract No. EP-S5-06-01

June 2017

PREPARED FOR

U.S. Environmental Protection Agency

PREPARED BY

ch2m.

Ecology and Environment, Inc.
Environmental Design International, Inc.
Teska Associates, Inc.

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Contents

Tables

Figures

Appendix

Acronyms and Abbreviations

bgs	below ground surface
CH2M	CH2M HILL, Inc.
EPA	U.S. Environmental Protection Agency
FA	Facility Area
FOP	field operating procedure
FS	feasibility study
ft^2	square feet
IVBA	In Vitro Bioaccessibility Assay for Lead
mg/kg	milligrams per kilogram
OAZ	Old American Zinc Plant Superfund Site
ppm	parts per million
PRP	Potentially responsible party
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RI	remedial investigation
RD	remedial design
site	Old American Zinc Plant Superfund Site
SOP	standard operating procedure
TCRA	Time Critical Removal Action
XTRA	XTRA Intermodal, Inc.

SECTION 1

Introduction

This document defines the procedures that will be used to perform the remedial design (RD) sampling for the Old American Zinc (OAZ) Superfund Site, in accordance with the U.S. Environmental Protection Agency (EPA) Statement of Work, dated February 17, 2017, for Work Assignment No. 224-RDRD-B5A1.

This field sampling plan contains the following components:

- Section 1 presents a brief background, purpose, and general approach of the project and field activities.
- Section 2 describes the general approach for the sampling program.
- Section 3 presents the general field investigation program, including the field tasks, sampling equipment, and sampling procedures.
- Section 4 provides the technical guidelines to be used during the field event. It gives the sample identification, sample custody, and quality assurance (QA)/quality control (QC) requirements for sample collection, handling, and shipping.
- Section 5 provides the project-specific information, including proposed number of access agreements to be mailed, proposed residential properties to be sampled, primary and QA/QC samples to be collected, and schedule for RD activities.
- Section 6 provides the references cited in this document.
- Appendix A contains the field operating procedures (FOPs) for residential sampling, sampling handling, packaging, and shipping, field logbook documentation, chain-of-custody documentation, and decontamination of personnel and equipment.

1.1 Site Description

1.1.1 Site Location

The OAZ Superfund Site (Figure 1-1) is located in the Village of Fairmont City in St. Clair County, Illinois. The site includes a 132-acre Facility Area (FA) and surrounding properties, where elevated metal concentrations associated with the facility operation were found in different media. The FA is bordered by several commercial and industrial properties, including Garcia Trucking to the west, CSX Intermodal railroad yard to the south, and General Chemicals to the east. The majority of the residential properties lie to the west of the FA, with smaller pockets of residential or trailer park developments to the south, east, and north of the FA. OAZ conducted zinc-smelting operations at the site from 1916 to 1967. Slag from the smelting operation was cooled by placing the molten material along the northern and western boundary of the FA. The slag stockpiles originally encompassed an area of 15 acres. The site, including the clinker and other smelting residues on the property, was purchased by XTRA Intermodal, Inc. (XTRA), in 1979. XTRA operated a trucking terminal at the site until 2003 that involved the leasing, storage, and maintenance of a diverse fleet of trailers. XTRA ground up and redistributed the slag stockpiles on the FA to build up and level the former plant site to facilitate its trucking operation. At present, redistributed slag on the FA covers an area of 125 acres with thickness ranging from 6 inches to 9 feet (ENTACT 2012).

1.1.2 Site History

Site investigations conducted at the site since 1994 detail the nature and extent of contamination in the FA and surrounding properties. ENTACT completed a remedial investigation (RI) (ENTACT 2009) and feasibility study (FS) (ENTACT 2012) for the FA in 2012 and identified contaminants in different media that included slag stockpiles, ground slag that was used as fill material, and high metal concentrations in shallow groundwater.

The impacted surrounding areas include residential, commercial, and vacant properties, village alleyways and drainageways that were contaminated with runoff from the facility. Ground slag was transported to offsite properties by local businesses, residents, and the village for surfacing village alleyways and used as fill material in residential properties (ENTACT 2012). The majority of the impacted properties are located to the west of the FA, with small pockets of trailer park and residential developments to the north, south, and east.

EPA, under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act, conducted a Time-Critical Removal Action (TCRA) from 2002 to 2003. A total of 462 offsite properties was sampled during the TCRA, of which 209 properties were found to have lead concentrations above the TCRA Removal Action Limit of 400 parts per million (ppm) for residential properties and 1,000 ppm for commercial properties. Impacted soil was removed from 152 properties, with the remaining properties to be addressed under future remedial action. An additional 25 properties and 8 alleyways were sampled as part of the RI.

Following the completion of the RI/FS in 2012, a Record of Decision (EPA 2012) was issued by EPA detailing the selected remedial approach for the site. EPA entered into an Administrative Order on Consent with the potentially responsible party (PRP) in August 2014 to perform the RD work, and ARCADIS was tasked to perform the design. An additional 14 residential properties were sampled as part of the predesign investigation (ARCADIS 2016a), and a draft final RD report (consisting of the report, selected drawings, but no technical specifications) (ARCADIS 2016b) was submitted to EPA in April 2016. The entity responsible for the PRP's work filed for Chapter 11 bankruptcy and ceased performing additional work at the site in April 2016. As a result, EPA took control of the site in order to complete the RD. EPA, under Work Assignment No. 224-RDRD-B5A1, has tasked CH2M HILL, Inc. (CH2M) to complete the RD activities for the selected remedy, in the FA and offsite properties.

1.2 Purpose

The purpose of this soil sampling is to collect additional data to evaluate the nature and extent of the contaminants of concern (arsenic, cadmium, zinc, and lead) in offsite residential, vacant, and commercial properties and alleyways associated with the OAZ Superfund Site in order to complete the RD and to determine the site-specific in vitro bioavailability (IVBA) for lead at residential properties.

The contaminants of concern (arsenic, cadmium, zinc, and lead) were identified in the previous site investigations (RI report [ENTACT 2009]). Soil samples will be collected to evaluate the nature and extent of the contamination in properties that require additional data and properties not previously sampled. The data will be used to identify excavation depths for those properties with cleanup level exceedances. A site-specific residential cleanup level for lead has not be established for the site. The results of the IVBA sampling to be conducted as part of this data collection effort will be used to develop a site-specific risk-based cleanup criterion for lead in residential properties. The remedial action will be completed under a separate work assignment.

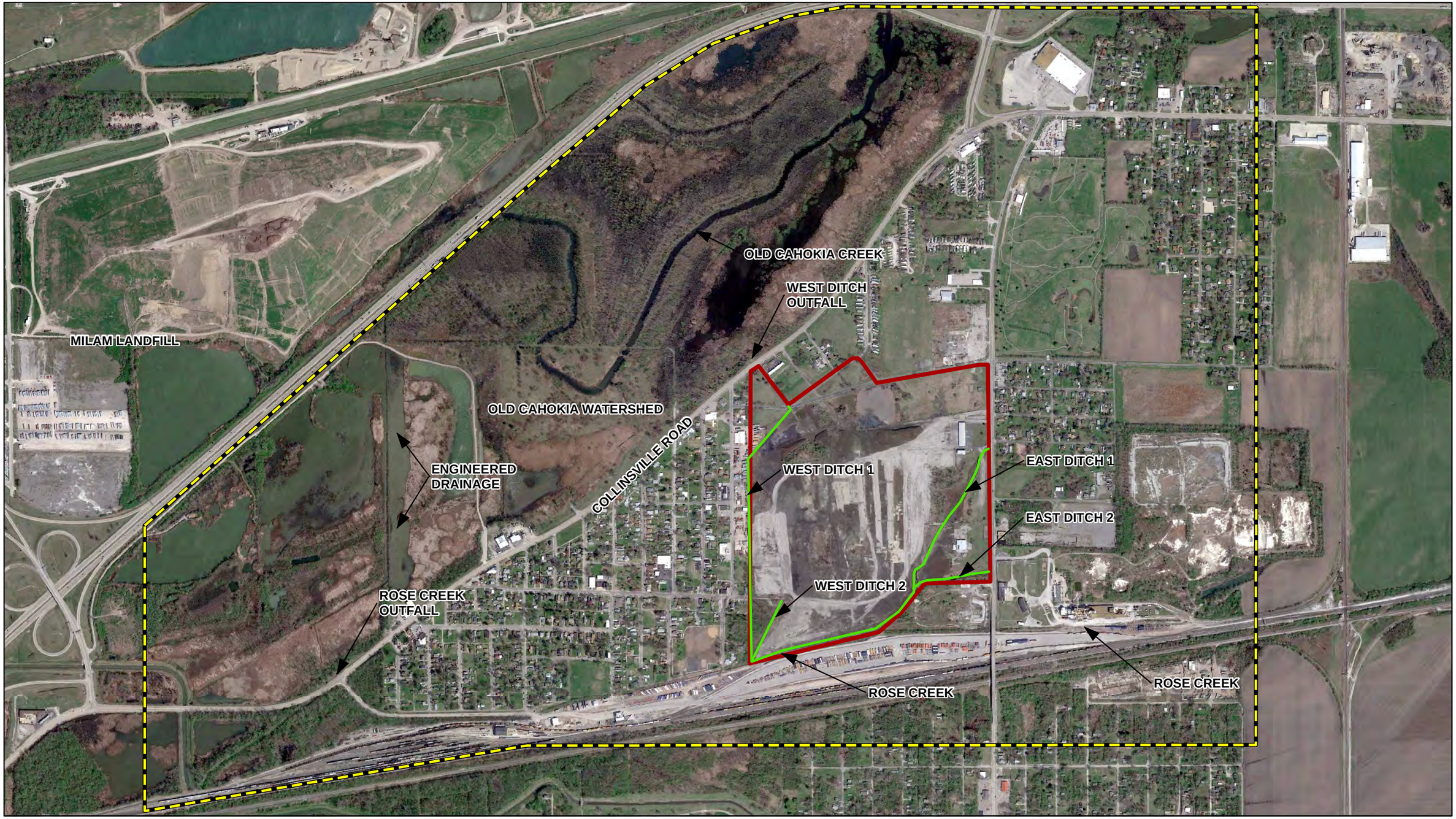
1.3 Approach

CH2M will collect soil samples to be analyzed for arsenic, cadmium, lead, and zinc from residential, vacant, and commercial properties within the project area. The properties to be sampled were selected from the following:

- Properties identified in the master database provided by the PRPs:
  - 74 properties are listed as to be remediated, including 2 alleyways, 11 commercial, and 61 residential properties.
  - 4 properties are listed as to be remediated based on predesign investigation results.
  - 5 properties are listed as access denied.
  - 59 properties are listed as more data needed, including 6 alleyways and 53 residential properties.
  - 12 properties are listed as exceeding PRGs in post-verification samples.
- Additional residential and alleyway soil sampling to be conducted by CH2M. An estimated 300 properties and 31 alleyways will be sampled.

Access agreements will be mailed to the owners of each property. The properties will be verified as part of the RD sampling. A prefinal and final RD will be prepared for properties with arsenic, cadmium, lead, and zinc concentrations exceeding the remediation goals based on sampling results. Identifying specific properties that require remediation for metals concentrations is needed for the remedial action for the following reasons:

- To receive competitive remedial action bids based on a completed RD with actual quantities.
- To plan and optimize the remedial action based on a completed RD so that EPA and contractors may optimize project management, labor, and the schedule.
- To maximize production progress based on unit price work that was bid.
- To avoid potential change orders and delays that could occur when access, sampling, and design activities are ongoing with remediation.
- To negotiate lower transportation and disposal costs with disposal facilities based on actual volumes.



N

0 1,000 2,000

Feet

LEGEND

- EXISTING DITCH LINE
- FACILITY AREA BOUNDARY
- SITE PROPERTY (APPROXIMATE)

Notes:
1. Google earth Imagery Date: 4/2/2016.

DRAFT

Figure 1-1
Site Plan and Existing Conditions
Old American Zinc Site
Fairmont City, Illinois

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SECTION 2

Sample Network Rationale

As noted, the intent of the RD sampling is to determine the properties that need remedial action based on concentrations of arsenic, cadmium, lead, and zinc residential surface soil. Results of the sampling will be used to support the RD.

2.1 Sampling Program

The sampling locations are residential, vacant, or commercial properties that were not previously sampled as part of the interim removal actions and RD sampling events or select properties that will be resampled because they were only partially sampled previously or due to a change in site conditions, such as a housing structure that was demolished after sampling but before remedial action. Access agreements will be obtained from each individual property owner before sampling.

According to the *Superfund Lead-Contaminated Residential Sites Handbook* (EPA 2003), the number of composite sampling locations per property is determined by the property's square footage. Each property or alleyway will be sampled in the following manner and analyzed by an offsite laboratory for total arsenic, cadmium, lead, and zinc according to Method SW6010B:

- Advancement of soil borings with a hand auger to a maximum depth of 2 feet below ground surface (bgs). Five soil borings will be located to satisfy a 5-point composite per yard area (front, back, and side) at each property. Up to 1 composite soil sample per 6-inch interval from up to 4 depth intervals will be collected per yard area at each property. For properties under 5,000 square feet, up to 12 samples per property will be collected, and for properties greater than 5,000 square feet, up to 16 samples per property will be collected.
- Advancement of soil borings with a direct-push technology rig to a maximum depth of 2 feet bgs. Soil borings will be located to satisfy a 5-point composite per 2,500-square-foot area in each alleyway. A maximum of 16 composite soil samples are estimated per alleyway, assuming 4 composite samples with 1 from each of 4 depth intervals.
- Collecting surface soil samples to a maximum depth of 1 inch bgs. Surface soil samples will be located to satisfy a 30-point composite for one yard area (front yard or back yard) at up to 30 yards.

The sampling details are presented in Section 3 and the quality assurance project plan (QAPP) and subsequent addendums.

2.2 Analytical Program

The primary analytical objective is to collect data of sufficient quality to support the RD. In developing the analytical program for the field event, the project objectives and the following elements were considered:

- Determine appropriate and acceptable analytical methodology that meets the data quality objectives.
- Determine an effective analytical program with appropriate QA/QC requirements.

Soil samples will be analyzed to determine the concentrations of total arsenic, cadmium, zinc and lead. Soil samples will be analyzed by an offsite analytical laboratory. The specific number of samples and method requirements for the analysis conducted by the offsite laboratory are discussed in Section 3.

2.3 Field Sampling Program

The specific field sampling objectives were developed based on observations during the sampling conducted previously at the site, available information on past activities and suspected source areas, and available soil analytical data. The field sampling program consists of the following tasks:

- Coordinate access with property owners from office.
- Mobilize to the site for reconnaissance and sampling events.
- Subcontract and coordinate with the laboratories and third-party utility-locate firm.
- Locate utilities.
- Collect soil samples from residential, vacant, and commercial properties to determine if properties need remediation.
- Collect soil samplings from alleyways to determine if they need remediation.
- Submit soil samples to an offsite laboratory for total arsenic, cadmium, lead, and zinc analysis.
- Prepare property sketches with site features (sidewalks, walkways, patios and decking, and stairs), and obtain photographs of properties that need remediation.
- Demobilize.

Section 3 provides an overview of the equipment, operations, and procedures that will be used to perform the RD sampling and property sketching for each event. Specific FOPs are provided in Appendix A. FOPs provide step-by-step procedures for activities to be performed. In the instances where FOPs are not referenced, the text of that section serves as the FOP.

2.4 Access Agreements

CH2M will mail EPA-approved access agreements to property owners. The access agreement includes a request for the property owner to grant access for sampling and remedial action, if necessary, and to return the signed agreement in the addressed and stamped envelope to CH2M before mobilization. For property owners who deny access to their properties, CH2M will contact EPA. EPA will be responsible for addressing those properties.

2.5 Mobilization

This activity consists of mobilizing equipment and personnel before the sampling events.

2.6 Utility Locating

Utilities will be located by contacting the Illinois One-Call System (JULIE) to request that utilities be marked on each residential property that is to be sampled. The request can be made by phoning 811, within Illinois. Utility-location requests may be made online at http://www.illinois1call.com/. Each member utility will determine if it has an underground facility at each property and mark the location up to the meter. Representatives from the service stated that utilities will be marked within 2 days after the request has been made, not counting weekends and holidays. Electrical lines will be marked in red, gas in yellow, telephone and TV cable in orange, water in blue, and sewage in green. The markings will remain legally valid for 20 days from the time of the request. To ensure that the utilities are marked, CH2M will request that utilities be marked a week in advance. Access agreements, described in Section 2.4, enquire whether

property owners are aware of underground utilities at their properties that were added without assistance from the public utility companies and may not appear on a public utility map.

In addition, utilities will be located by a third-party utility-locating subcontractor since the Illinois One-Call System marks up to meters only. The utilities will be located prior to performing the soil sampling at each property or alleyway.

2.7 Laboratory Subcontracting and Coordinating

CH2M will contact the offsite analytical laboratory to coordinate sampling schedules and data turnaround times. Details regarding laboratory management are included in the QAPP.

2.8 Concrete/Asphalt Coring for Alleyway Sampling

CH2M will conduct coring through asphalt or concrete in alleyways to collect soil samples under concrete and/or asphalt surfaces. A 4-inch core of the concrete or asphalt surface will be removed using a direct-push technology rig or equivalent. The concrete and/or asphalt will be repaired using asphalt cold-patch material or QUIKCRETE concrete, as appropriate.

2.9 Soil Sampling Event

CH2M will conduct soil sampling at residential, vacant, commercial properties, and alleyways. The sampling events include preparation and sampling.

2.9.1 Preparation

The following activities will be completed to prepare for sampling:

- Review property maps to assign property identification numbers.
- Conduct health and safety briefing of field team members.
- Order field supplies and equipment.
- Prepare field sampling table that includes: property address, property sample ID, approximate square footage (if available)

2.9.2 Sampling

Based on guidance from EPA *Superfund Lead-Contaminated Residential Sites Handbook* (2003), the number of composite sampling locations per property is determined by the surface area of each property based on the following criteria and details presented in FOP-01, Sampling in Residential, Commercial, and Vacant Areas:

- **Less than 5,000 square feet (ft^2)—**Properties with a total surface area less than 5,000 ft^2 should have at least 5-point composite samples collected from the front, back, and side yards (if the size of the latter is substantial; EPA 2003). Properties that are vacant lots should be divided into three equally sized sections from the street to the alley, and samples collected from the front, middle, and back yards. A composite sample will be collected from 4 depth intervals below ground: 0 to 6 inches, 6 to 12 inches, 12 to 18 inches, and 18 to 24 inches. Four intervals from 3 sections of the yard totals 12 composite samples from each property for offsite laboratory analysis.

- **Equal to or Greater than 5,000 ft^2—**Properties with total surface area equal to or greater than 5,000 ft^2 should be divided into four sections roughly equal in area. To support the continuity of sod restoration in front yards during remedial action, the sections will be divided parallel to the street extending to the alley, but exceptions to this approach will be allowed on a property-by-property basis. To limit the amount of sod that will require replacement for aesthetic purposes, if the total

surface area of the property minus the estimated surface area of the house and garage footprint observed in the field, is less than 5,000 ft^2, then samples should be collected from the front, back, and side yards (as applicable) similar to the approach for properties less than 5,000 ft^2. The five-point composite samples should be collected at equal spacing and from the same depth interval (EPA 2003). Up to 16 composite soil samples will be collected at each property for offsite laboratory analysis.

- **Alleyways—**One 5-point composite will be collected per 2,500 square feet of alleyway (divide the alleyway in sections approximately 170 feet long, based on a 15-foot-wide alleyway). Space the 5 sample points equally in the alleyway sections, outside of any drip zones and away from influences of other painted surfaces. Composites should consist of aliquots collected from the same depth interval and will be submitted to an offsite laboratory for analysis.

The following describes the soil sampling process to be followed when sampling residential properties for the *In Vitro* Bioaccessibility Study:

- **Surface Sampling (IVBA Study)—**One 30-point composite from one yard area per property will be collected. Aliquots collected at equal spacing and from the same depth interval (0 to 1 inch) should be obtained from one yard area, preferably from the yard where there is the most evidence of children playing. Aliquots will be collected using a clean, decontaminated incremental sampling tool in order to collect the same amount of material from each aliquot. Each aliquot should be collected away from influences of the drip zone and any other painted surfaces. It should also be noted if there is evidence of the soils being amended with phosphate (*does it appear that the property has been treated with fertilizer?*). Samples should not be collected from garden areas to avoid phosphate from fertilizers that affect the reliability of the analytical results.

Drip zones, which include soil within 18 inches of the house, will not be sampled during the RD sampling event because they are not significant sources of lead, arsenic, cadmium, and zinc.

Each composite sample will comprise samples from aliquot locations within the depth interval to obtain a representative sample of the property or alleyway. The composite samples will be analyzed by an offsite analytical laboratory for total arsenic, lead, cadmium, and zinc. Roughly 2 to 4 ounces of soil will be collected from each of the points per depth interval. Therefore, each composite sample from the depth interval will comprise more than 10 ounces of soil for laboratory analysis. The samples will be collected with a hand auger (residential, vacant, and commercial properties), a direct-push technology rig (alleyways), and an incremental sampling tool (IVBA study). Before the composite sample is analyzed, rocks, miscellaneous debris, and vegetation will be removed.

As presented in the QAPP and Section 3.5, QA/QC samples will be collected based on the number of soil samples. Field duplicates will be collected for every 10 soil laboratory samples collected. Matrix spike and matrix spike duplicates will be collected for every 20 soil laboratory samples collected. Equipment blanks will be collected at a rate of one per sampling shift per sampling team. A sampling shift is expected to be 10 days. QA/QC samples will be analyzed for total arsenic, lead, cadmium, and zinc by the offsite laboratory (Table 2-1).

During sampling activities, the sample teams will use and update the field sampling table. Addresses and critical parcel location information will be added to the table as needed.

2.10 Property Sketches and Photographs

CH2M will prepare sketches of each property that exceeds the cleanup criteria as presented in Table 2-1:

Table 2-1. Final Cleanup Levels for Old American Zinc Plant Site
Old American Zinc Plant Site—Fairmont City, Illinois

	Soil/Sediment	
Contaminants of Concern	**Residential (mg/kg)**	**Non-Residential (mg/kg)**
Arsenic	32	239
Cadmium	37	809
Lead	400[a]	826
Zinc	6,400	31,852[b]/306,000[c]

[a] EPA may specify a site-specific cleanup level for lead based on the IVBA study; currently using the remedial action level of 400 ppm.
[b] Based on Ecological Risk for Sediment
[c] Based on Human Health Risk for Soil/Sediment

mg/kg = milligrams per kilogram

CH2M will measure and record property dimensions, including front, back, and side yards as applicable for properties with total surface area less than 5,000 ft^2, and sections for properties with total surface area greater than 5,000 ft^2. Permanent property features such as sidewalks, walkways, patios, decking, and stairs, along with trees and shrubs, will be recorded. Landscaping features (excluding trees and shrubs), utilities, debris, and crawlspaces will not be recorded. CH2M also will take digital photographs of each property. Digital video may also be recorded for individual properties at the discretion of field staff and used as backup information only.

2.11 Waste

Personal protective equipment, disposable sampling equipment, and asphalt and concrete cuttings generated during the site investigation will be disposed of in a leased solid waste receptacle located at the field office. Liquid wastes will only include overspray decontamination water and will be disposed of in the sanitary sewer or to the ground. Soil excavated from the properties will be placed back into the hole unless submitted to the offsite laboratory for analysis. Soil left over from the sample collection process will be placed back into the holes from which soil is extracted.

2.12 Demobilization

At the completion of fieldwork, personnel, equipment, and supplies will be demobilized from the site. No site restoration activities are expected, other than those required at each sampling location.

SECTION 3

General Field Operations

3.1 Sampling

The location and number of samples will be determined by the square footage of the individual property, per the instructions in FOP-01.

3.2 Sample Management

Section 3.2 describes the procedures to be implemented to identify, containerize, preserve, ship, and otherwise handle environmental samples in a manner that will maintain sample integrity. The QAPP has additional details regarding sample management. The use of the techniques will reduce the possibility of sample contamination from external sources.

3.2.1 Sample Identification

A sample numbering system will be used to identify each sample, including duplicate and replicate samples. The sample number will be a unique identifier.

Each sample, regardless of analytical protocol, will also be assigned a CH2M site-specific identifier, which will contain a site- and sample-specific location identifier that indicates where the sample was obtained.

The sample number and station location identifier will be included on the sample tag, the traffic report, and the chain-of-custody record.

The site-specific identifier is based on the system described in the following subsection.

3.2.1.1 Residential, Commercial, and Vacant Soil Samples

Station IDs will be assigned to each address prior to the field event (i.e., a number 001 through 1000). The sample ID will consist of the site identifier, station ID, the yard designation, and the depth interval.

- **Site Identifier—**The site is Old American Zinc Plant Superfund Site and is designated with a 3-digit ID: OAZ.
- **Station Location—**The station location identifier is the 3-digit unique ID. The station location IDs will be assigned to each property where access has been obtained and will be provided in a table showing the station location ID (001 through 1000) and the property address.
- **Yard Designation—**The yard designation identifier follows the station location identifier. The yard designation will provide the area of the yard where the sample was collected. For properties less than 5,000 square feet, the yard designations are “F” for front yard, “B” for back yard, or “S” for side yard. For properties greater than 5,000 square feet, the yard designations are “A”, “B”, “C”, and “D” when the yard is divided into parallel sections.
- **Depth Indicator—**Depth indicator codes will follow the yard designation. The code will consist of a hyphen, followed by the starting and bottom depth intervals separated by a slash. The indicator will provide the depth that represents the start and end of the sample interval in inches below ground. For example, the sample depth designation will be “-06” for the sample collected from an interval of 0 to 6 inches below ground. A soil sample from the front yard of property 156 taken from the depth of 0 to 6 inches would be identified as OAZ-156F-00/06.

3.2.1.2 Other Samples

- **QA/QC Identifier—**Field QA/QC samples will be identified using the following identifiers:
  - Equipment blanks, which are not associated with an individual station location, are numbered sequentially and are identified by the first two letters of the station location code (for example, EB001).
  - Field duplicates, which are associated with the same station location as the native sample, are identified with an "R" (for "replicate") appended to the end of the location code. For example, the duplicate of sample OAZ-156F-00/06 would be labeled OAZ-156F-00/06R.
- **Laboratory QC Samples—**A sample collected for laboratory QC, such as a matrix spike sample, is considered to be a single sample, even though additional volume is provided to the laboratory. Laboratory QC samples are assigned a single sample number and station location identifier. Laboratory QC samples are not identified in the station location code but rather are called out on the chain-of-custody form in the *Samples to be Used for Laboratory QC* field and on the sample tag.
- **IVBA Samples—**Composite samples collected for the IVBA study will be identified with the site identifier, station location ID, the yard designation, and the depth interval. A sample collected from the front yard of property 156 taken from a depth interval of 0 to 1 inch would be identified as OAZ-156F-00/01.
- **Alleyway Soil Samples—**Station IDs will be assigned to each alleyway prior to the field event (i.e., a number A01 through A31). The sample ID will consist of the site identifier, station ID, the composite designation, and the depth interval. The composite designation will be assigned a two-digit number (i.e., a number 01 through 99) for the section of the alleyway, and the numbering scheme will start North to South or East to West (depending on the direction of the alleyway). A sample collected from the furthest East section of the A02 alleyway taken from a depth interval of 6 to 12 inches would be identified as OAZ-A02-01-06/12.

3.2.2 Sample Containers

Contaminant-free sample containers will be obtained from the contracted laboratory. Table 3-1 summarizes the containers needed for the field investigations. Sample containers for laboratory analyses will meet or exceed the requirements specified in Office of Solid Waste and Emergency Response Directive #9240-05A, *Specifications and Guidance for Obtaining Contaminant-Free Containers* (April 1990). Containers used for sampling will not contain target inorganic contaminants exceeding the level specified in the document mentioned above. Specifications for containers will be verified by checking the supplier's certified statement and analytical results for each lot.

Table 3-1. Sample Containers, Preservations, and Holding Times
Old American Zinc Plant Site—Fairmont City, Illinois

Analyte Group	Matrix	Method/SOP	Containers	Preservation	Analytical Holding Time	Data Package Turnaround Time
Metals	Soil	ISM02.4/Laboratory SOP 1	1 x 4-oz. glass jar	None	180 days	60 days (final)
Metals	Soil	Physiologically Based Extraction (bio-accessibility of lead)/Laboratory SOP 2	1 x 4-oz. glass jar	< 6 degrees Celsius	180 days	21 days (final)

SOP = standard operating procedure

Equipment blanks will be used to monitor for contamination. Corrective actions will be taken as soon as a problem is identified and may include the following:

- Discontinuing the use of a specific container lot
- Contacting suppliers for retesting the representative container from a suspect lot
- Assessing decontamination procedures
- Resampling suspect samples
- Validating the data

3.2.3 Sample Preservation and Holding Times

Sample containers and sample holding times will meet the requirements set forth by EPA.
The laboratories will certify sample containers as pre-cleaned. Samples for chemical analysis will be transported to the laboratory in coolers. Table 3-1 lists the preservation/storage requirements and holding times for the analyses to be performed.

3.2.4 Sample Handling, Packaging, and Shipping

Sample handling procedures are described in FOP-05, Sample Handling and Chain-of-Custody Procedure, and sample packaging and shipping procedures are described in FOP-06, Packing and Shipping of Environmental Samples. Sample coolers will be shipped to arrive at the laboratory in the morning (priority overnight). The laboratory will be notified of the sample shipment and the estimated date of arrival of the samples being delivered.

3.3 Field Activity Documentation and Logbook

CH2M will use several procedures to document the location, media, and parameters of samples collected in the field. A bound field logbook will be maintained to record the following: the acquisition of each sample, sampling locations to be photographed, property sketches, chain-of-custody forms for environmental samples and field QC samples be completed, and the sample locations on site drawings in relation to permanent landmarks or site features.

3.3.1 Field Logbook

A field sampling logbook will be initiated at the start of the first onsite activity and maintained to document field activities throughout the field effort in accordance with FOP-07, Note Taking and Field Logbook.

3.3.2 Field Sampling Table

The field sampling table will be prepared prior to the start of fieldwork and will detail the property address, the assigned station location, and the estimated square footage. The field sampling teams will update the field sampling table as necessary.

3.3.3 Photographic Documentation

The field team leader or designee will photograph field activities to complement descriptions of field activities in the field logbook, as well as each individual property. The following information will be recorded in the logbook when photographs are taken:

- Date and time
- Exposure number/roll number or digital file name
- Location of the photograph
- Description and identification of the subject
- The initials of the person who took the photograph

CH2M will maintain photographs for reference during the project.

3.3.4 Property Sketches

Basic property sketches, including sample locations, will be documented during the sampling events. After the sampling events, a separate sketching event will be conducted to prepare a more detailed sketch that will aid in the remedial design. The sketches should identify and include dimensions of site features such as permanent structures, patios, decking, trees, and other immovable objects. Landscaping, utilities, debris, and crawlspaces will not be recorded. Dimensions of the property should also be included in the sketches. The sketches will aid in the RD for excavation plans, specifications, and cost estimates.

3.3.5 Sample Chain of Custody

For samples collected for analysis, the EPA chain-of-custody protocols will be followed, as described in the *National Enforcement Investigations Center Policies and Procedures*, EPA-330/9-78-DDI-R (rev. June 1985). Chain-of-custody forms will be completed using EPA's Scribe software. Custody procedures are described in the QAPP. The protocol for filling out the chain of custody is provided in FOP-05, Sample Handling and Chain-of-Custody Procedure. Appendix B contains laboratory-specific standard operating procedures for sample log-in, storage, and internal chain-of-custody.

3.4 Field Data Reporting

Information collected in the field through visual observation, manual measurement, or field instrumentation will be recorded in field notebooks, data sheets, or forms and then entered into an electronic data log. The field team leader will review the data for adherence to the QAPP and consistency of data. Concerns identified will be corrected and incorporated into the data evaluation process. The field team leader will review field data calculations, transfers, and interpretations conducted by the field team. Field data logs and documents will be checked for the following:

- General completeness
- Readability
- Use of appropriate procedures and modifications to sampling procedures are clearly stated
- Reasonability of data collected
- Correctness of sample locations
- Correctness of reporting units and interpretations

Original field logs, documents, and data reductions will be kept in the project file.

3.5 Quality Assurance/Quality Control Sample Procedures

QA/QC samples include field duplicates, equipment blanks, and matrix spike/matrix spike duplicates. QA/QC samples will not be collected for moisture content.

3.5.1 Field Duplicates

Field duplicates will be used to measure the heterogeneity of the sample matrix and the precision of the field sampling and analytical process. Duplicate samples will be collected at a frequency of at least 1 duplicate per 10 samples per sampling technique collected for each medium. Field duplicates will be collected in the same manner as the field samples. The sample bottles will be labeled as described in this plan. Duplicates will be preserved and stored in the same manner as the field samples.

3.5.2 Equipment Blanks

Equipment blanks will be collected and analyzed to determine whether decontamination has been adequately performed and that no cross-contamination of samples has occurred because of the equipment or residual decontamination solutions. Equipment blanks will be collected for the matrices to be sampled. A consistent volume of demonstrated analyte-free distilled and deionized water will be poured directly into or over the decontaminated sampling equipment and then collected in a sample container. The sample bottles will be labeled as described in the plan. The samples will be preserved and handled in the same manner as groundwater samples. The frequency of collection will be at least 1 equipment blank per sampling team per sampling shift for each medium. A sampling shift is estimated to be 10 days.

3.5.3 Matrix Spike / Matrix Spike Duplicates

The laboratory will use matrix spike and matrix spike duplicate samples to assess the precision and accuracy of sample analysis. The samples will be fortified by the laboratories in accordance with the specifications of the analytical methods. Two extra volumes of sample are required for each combination of samples. Sample containers will be filled and stored in the same manner as field duplicate samples. The frequency for collection of matrix spike/matrix spike duplicate samples will be at least 1 matrix spike/matrix spike duplicate pair per 20 samples per sampling technique collected for each medium.

3.6 Decontamination Procedures

Decontamination of personnel and sampling and monitoring equipment will follow the procedures presented in FOP-08, Equipment Decontamination Procedures. The potable water to be used to decontaminate equipment will be distilled water purchased for the sampling event mixed with Alconox, Liquinox, or equivalent.

3.7 Disposal of Generated Wastes

The following materials may become wastes requiring proper treatment, storage, and disposal:

- Personal protective equipment (for example, gloves)
- Soil cuttings from hand augering
- Asphalt/concrete cuttings from coring
- Decontamination water
- Disposable equipment (broken or unused sample containers, sample container boxes, tape, and plastic bags)

Management of wastes and materials will be performed consistent with the EPA guidance *Guide to Management of Investigation—Derived Wastes*, 9345.3-03FS (January 1992). Disposable equipment, including personal protective equipment and small quantities of asphalt and/or concrete cuttings, will be disposed of in solid waste containers. Water generated during equipment decontamination will be disposed of in the sanitary sewer system. Soil cuttings from sampling will be returned to sample location. Appendix B of the QAPP contains laboratory standard operating procedures for sample disposal.

SECTION 4

Project-Specific Details

4.1 Access Agreements

As part of this project, access agreements will be mailed, prior to soil sampling, to approximately 300 residential, vacant, and commercial properties. Additional access agreements will be sent if additional property owners make requests for sampling or EPA extends the target sampling area.

4.2 Residential Sampling

Approximately properties and alleyways will be sampled for arsenic, lead, cadmium, and zinc as part of the work assignment. Based on the *Superfund Lead-Contaminated Residential Sites Handbook* (EPA 2003) and previous sampling events, approximately nine soil samples, including QA/QC samples, are collected from each property. Samples are required to characterize the four soil depths (0 to 6 inches, 6 to 12 inches, 12 to 18 inches, and 18 to 24 inches) at each property. The properties generally are divided into two to four parts. This is the basis for the estimate of 4,327 samples shown in Table 4-1, which includes QA/QC samples. The samples will be submitted to a Contract Laboratory Program laboratory. Samples will be analyzed as listed in Table 4-1.

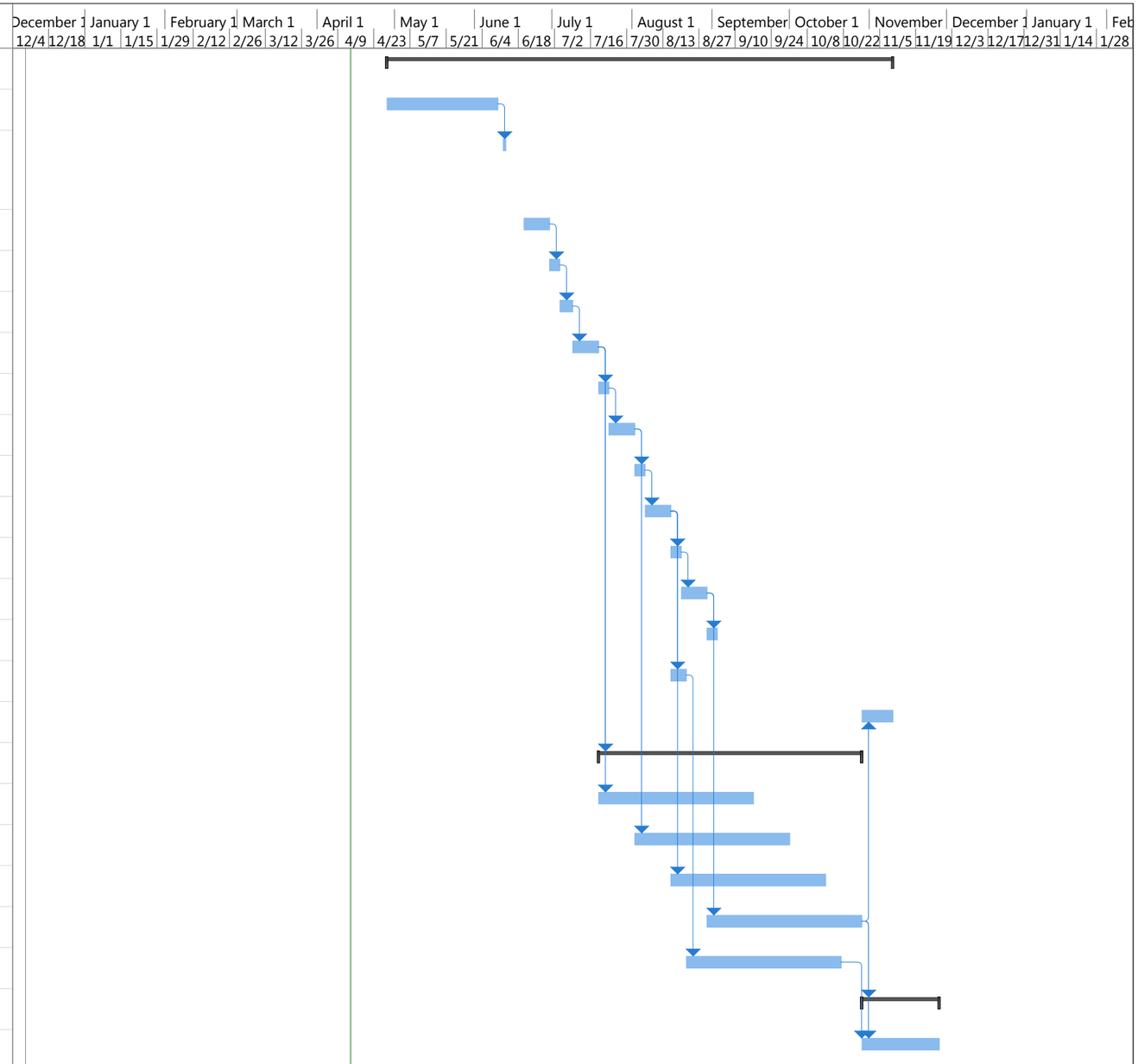
Table 4-1. Sample Count
Old American Zinc Plant Site–Fairmont City, Illinois

Matrix	Analyte/ Analytical Group	Estimated Number of Field Samples	Field Duplicates	Matrix Spikes/ Matrix Spike Duplicates [a]	Field Blanks	Equipment Blanks	Estimated Total No. Analyses
Surface, Subsurface Soils (Residential/ Commercial/ Vacant)	Total Metals (arsenic, zinc, cadmium, lead) (soil)	3,600	360	180/180	0	7	4,327
Surface, Subsurface Soils (Alleyways)	Total Metals (arsenic, zinc, cadmium, lead) (soil)	496	50	25/25	0	1	597
IVBA Study	Total Lead (soil)	30	3	2/2	0	1	38
IVBA Study	In Vitro Bioaccessibility	30	3	2/2	0	1	38

4.3 Schedule

Figure 4-1 presents the schedule for this field project.

ID	Task Mode	Task Name	Duration	Start	Finish
10		**Task 3: Field Investigation**	**137 days**	**Fri 4/28/17**	**Fri 11/10/17**
11		Mail Access Agreements	30 days	Fri 4/28/17	Fri 6/9/17
12		Receive access agreements (from mailing, public meeting and face to face collection)	1 day	Mon 6/12/17	Mon 6/12/17
13		Utility Clearing	10 edays	Tue 6/20/17	Fri 6/30/17
14		Team Break	4 edays	Fri 6/30/17	Tue 7/4/17
15		Utility Clearing	5 edays	Tue 7/4/17	Sun 7/9/17
16		Residential Sampling (Shift 1)	10 edays	Sun 7/9/17	Wed 7/19/17
17		Team Break	4 edays	Wed 7/19/17	Sun 7/23/17
18		Residential Sampling (Shift 2)	10 edays	Sun 7/23/17	Wed 8/2/17
19		Team Break	4 edays	Wed 8/2/17	Sun 8/6/17
20		Residential Sampling (Shift 3)	10 edays	Sun 8/6/17	Wed 8/16/17
21		Team Break	4 edays	Wed 8/16/17	Sun 8/20/17
22		Alleyway Sampling	10 edays	Sun 8/20/17	Wed 8/30/17
23		Team Break	4 edays	Wed 8/30/17	Sun 9/3/17
24		Bioaccessibility Sampling	6 edays	Wed 8/16/17	Tue 8/22/17
25		Site Sketching	12 edays	Sun 10/29/17	Fri 11/10/17
26		**Task 4: Sample Analysis**	**72 days**	**Wed 7/19/17**	**Sun 10/29/17**
27		Shift 1	60 edays	Wed 7/19/17	Sun 9/17/17
28		Shift 2	60 edays	Wed 8/2/17	Sun 10/1/17
29		Shift 3	60 edays	Wed 8/16/17	Sun 10/15/17
30		Alleyway Sampling	60 edays	Wed 8/30/17	Sun 10/29/17
31		Bioaccessibility Sampling	60 edays	Tue 8/22/17	Sat 10/21/17
32		**Task 5: Data Validation**	**21 days**	**Sun 10/29/17**	**Tue 11/28/17**
33		Data Validation	30 edays	Sun 10/29/17	Tue 11/28/17



Project: ASARCO_RIFS_final
Date: Fri 4/14/17

Task	Project Summary	Manual Task	Start-only	Deadline			
Split	Inactive Task	Duration-only	Finish-only	Progress			
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress			
Summary	Inactive Summary	Manual Summary	External Milestone				

Figure 4-1
Project Schedule
Old American Zinc Site
Fairmont City, Illinois

SECTION 5

References

ARCADIS. 2016a. *Pre-Design Investigation Report, Fairmont City, Old American Zinc Plant Site, Fairmont City, Illinois.* January

ARCADIS. 2016b. *Draft Final Design Report, Fairmont City, Old American Zinc Plant Site, Fairmont City, Illinois.* March.

ENTACT. 2009. *Final Remedial Investigation Report, Old American Zinc Plant Site, Fairmont City, Illinois.* March.

ENTACT. 2012. *Final Feasibility Study Document for the Old American Zinc Plant Site, Fairmont City, Illinois.* February.

U.S. Environmental Protection Agency (EPA). 1985. *National Enforcement Investigations Center Policies and Procedures*. EPA-330/9-78-DDI-R. rev. June.

U.S. Environmental Protection Agency (EPA). 1992. *Guide to Management of Investigation—Derived Wastes, 9345.3-03FS.* January.

U.S. Environmental Protection Agency (EPA). 2012. *Record of Decision, Old American Zinc Plant Superfund Site.* September.

Appendix A
Field Operating Procedures

Field Operating Procedure No. 1
Soil Sampling in Residential, Commercial and Vacant Areas

Old American Zinc Plant Superfund Site,
Fairmont City, St. Clair County, Illinois
Remedial Design
WA No. 224-RDRD-B5A1/Contract No. EP-S5-06-01

Revision Number: 0
Prepared: 3/10/2017

Approved By:

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Rachel Grand, Site Manager Date

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Theresa Rojas, Program Quality Manager Date

Sampling in Residential, Commercial or Vacant Areas

1.1 Purpose

This document describes the soil sampling process to be followed when sampling residential, commercial or vacant properties.

1.2 Scope and Applicability

This document describes the soil sampling process to be followed by CH2M HILL, Inc. when sampling residential, commercial, or vacant properties. The document discusses steps that must occur during sampling. This document should be reviewed by the field project team prior to working in the field.

Sampling will be performed using hand augers.

1.3 Equipment

- Hand auger
- Decontamination kits: distilled water, detergent solution, spray bottles, paper towels
- Laboratory-supplied bottleware
- Clean, unused garbage bags
- 5-gallon buckets
- Stainless steel spoons

1.4 Procedures

1.4.1 Properties with Less than 5,000-Square-Foot Surface Area

When sampling properties with a total surface area less than 5,000 square feet (a typical urban lot size), collect five-point composite samples from at least each of the following locations: the front yard, the back yard, and the side yard (if the size of the latter is substantial). Space the front, back, and side yard composites equally within the respective part of the yard and outside the drip zone, away from influences of other painted surfaces (Figures 1 and 2). Composites should consist of aliquots collected from the same depth interval.

From U.S. Environmental Protection Agency. 2003. *Lead-Contaminated Residential Sites Handbook.* August.

Figure 1. Recommended Minimum Soil Sampling in Yards Less Than or Equal to 5,000 Square Feet with Small Side Yard

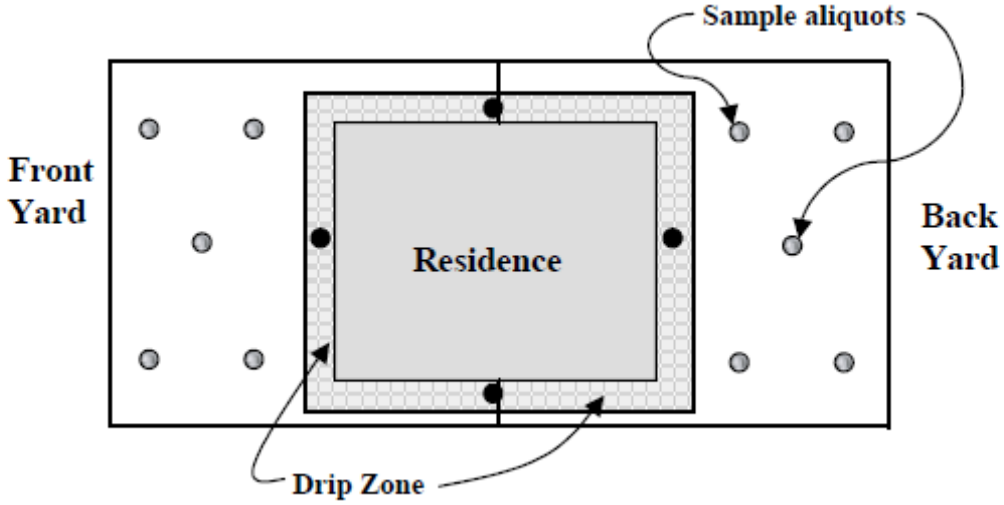
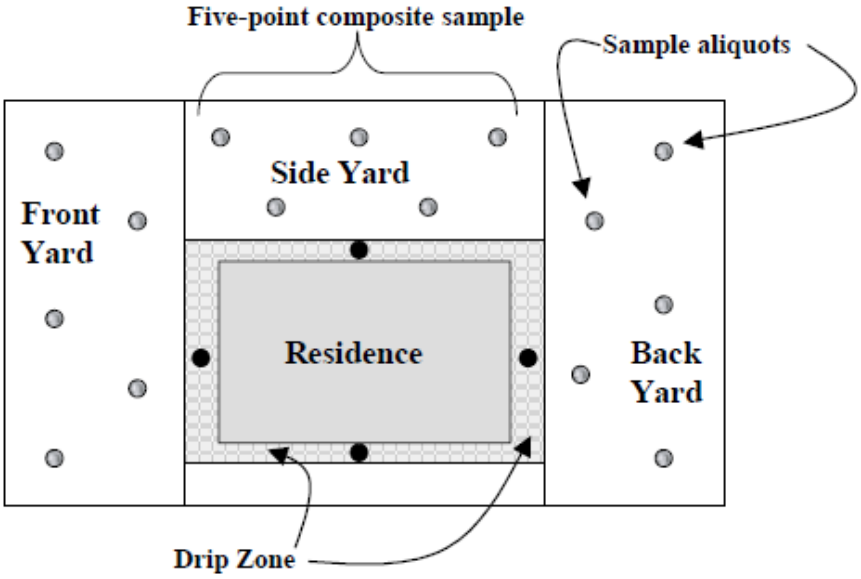


Figure 2. Recommended Minimum Soil Sampling in Yards Less Than or Equal to 5,000 Square Feet with Substantial Side Yard



Collect five-point composite samples from the front and back yards. Collect aliquots for a single composite sample from the same depth interval. Also, collect soil samples from distinct play areas and gardens if present, and from unpaved driveways and minimal use areas, such as areas under porches and crawlspaces. Space aliquot locations equally within the area of the yard where the composite is collected. Figure 1 illustrates one possible arrangement of the sample aliquots.

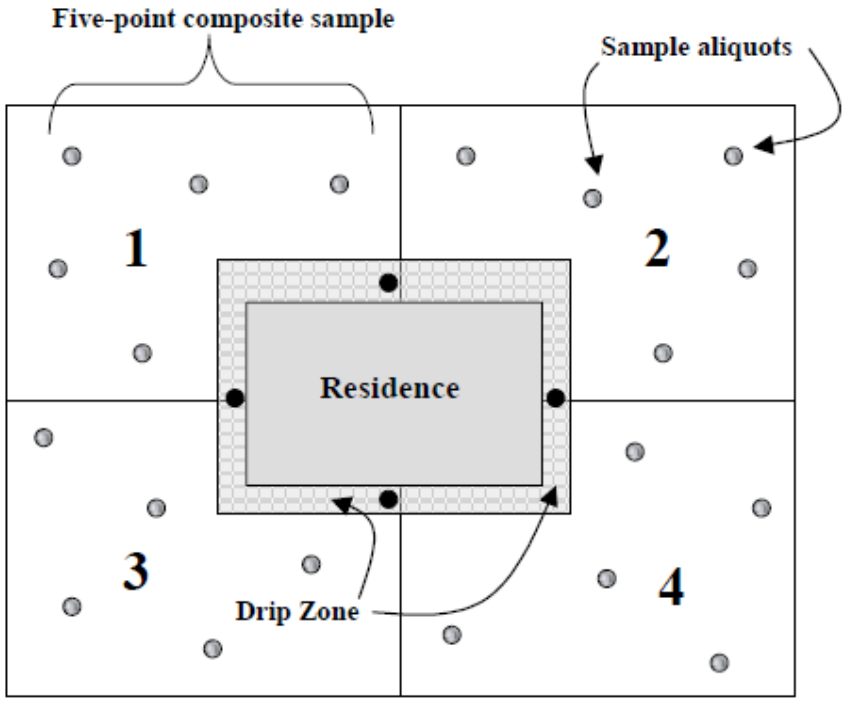
Collect five-point composite samples from the front, back, and side yards, along with other areas as described in Figure 1. Space aliquot locations equally within the area of the yard from which the composite is collected. The figure illustrates one possible arrangement of the sample aliquots. Collect aliquots for a single composite sample from the same depth interval.

1.4.2 Properties with Greater than 5,000-Square-Foot Surface Area

For lots with a surface area greater than 5,000 square feet, divide the property into four quadrants of roughly equal area. The two quadrants in the front yard should encompass one-half of the side yard, and so should the two quadrants in the back yard. One five-point composite of aliquots collected at equal spacing and from the

same depth interval should be obtained from each quadrant. Each aliquot should be collected away from influences of the drip zone and any other painted surfaces (Figure 3).

Figure 3. Recommended Minimum Soil Sampling in Yards Greater Than 5,000 Square Feet



Divide properties larger than 1 acre into 0.25-acre sections, and collect one five-point composite sample from each. For large properties, consider whether elevated concentrations trigger partial removal of soils or access restriction.

Collect five-point composite samples from each of the four quadrants as indicated above. Space the locations of the aliquots equally within each quadrant. Figure 3 illustrates one possible arrangement of the sample aliquots. The Drip Zone should not be sampled for the remedial design sampling event.

Composite samples should consist of discrete aliquots of equal amounts of soil. Collect the soil from each aliquot into a labeled garbage bag (used as a liner) in a 5-gallon bucket. Using a stainless-steel spoon, mix thoroughly. Once the sample is homogenized, place in the appropriate sample container. The sample can then be sent to the laboratory. Dispose of remaining sample volume in the general location from where it was collected, containerize, or archive, depending on the requirements of the project. In some cases, material other than grass and/or soil will be encountered at a sample location. For example, wood chips and sand often are found in recreational areas of day-care and school playgrounds. Samples of the soil below the cover material should be collected.

1.4.3 Sample Intervals

Sampling for select metals will be conducted to define the vertical extent of contamination for cleanup purposes at select properties. Composites should consist of aliquots collected from the same depth interval. Depth intervals include: 0 to 6 inches, 6 to 12 inches, 12 to 18 inches, and 18 to 24 inches below ground surface.

1.5 Quality Assurance/Quality Control

- Ensure samples are not collected within the Drip Zone.
- Ensure thorough mixing prior to analytical sample collection.

1.6 References

None.

Field Operating Procedure No. 2
Soil Sampling in Alleyways

Old American Zinc Plant Superfund Site,
Fairmont City, St. Clair County, Illinois
Remedial Design
WA No. 224-RDRD-B5A1/Contract No. EP-S5-06-01

Revision Number: 0
Prepared: 3/10/2017

Approved By:

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Rachel Grand, Site Manager Date

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Theresa Rojas, Program Quality Manager Date

Sampling in Alleyways

1.1 Purpose

This document describes the soil sampling process to be followed when sampling alleyways.

1.2 Scope and Applicability

This document describes the soil sampling process to be followed by CH2M HILL, Inc. when sampling alleyways. The document discusses steps that must occur during sampling. This document should be reviewed by the field project team prior to working in the field. In addition, this document should be used to develop scopes of work for drilling subcontractors.

Sampling will be performed using direct-push technology to drill through the asphalt or concrete surface.

1.3 Equipment

- Direct-push technology drilling rig
- MC-5 macrocores
- Decontamination kits: distilled water, detergent solution, spray bottles, and paper towels
- Laboratory-supplied bottleware
- Clean, unused garbage bags
- 5-gallon buckets
- Stainless-steel spoons

1.4 Procedures

1.4.1 Five-Point Sample Collection

When sampling alleyways, collect one 5-point composite per 2,500 square feet of alleyway (divide the alleyway in sections approximately 170 feet long, based on a 15-foot-wide alleyway). Space the 5 sample points equally in the alleyway sections, outside of any drip zones and away from influences of other painted surfaces. Composites should consist of aliquots collected from the same depth interval.

1.4.2 Sample Mixing

Composite samples should consist of discrete aliquots of equal amounts of soil. Collect the soil from each aliquot into a labeled garbage bag (used as a liner) in a 5-gallon bucket. Using a stainless-steel spoon, mix thoroughly. Once the sample is homogenized, place in the appropriate sample container. The sample can then be sent to the laboratory. Dispose of remaining sample volume in the general location from where it was collected, containerize, or archive, depending on the requirements of the project.

1.4.3 Sample Intervals

Sampling for select metals will be conducted to define the vertical extent of contamination for cleanup purposes at select alleyways. Composites should consist of aliquots collected from the same depth interval. Depth intervals include: 0 to 6 inches, 6 to 12 inches, 12 to 18 inches, and 18 to 24 inches below ground surface.

1.5 Quality Assurance/Quality Control

- Ensure samples are collected at the sample depth.
- Ensure thorough mixing prior to analytical sample collection.
- Ensure excess sample disposal in accordance with project requirements.

1.6 References

None.

Field Operating Procedure No. 3
In Vitro Bioaccessibility Sampling in Residential Areas

Old American Zinc Plant Superfund Site,
Fairmont City, St. Clair County, Illinois
Remedial Design
WA No. 224-RDRD-B5A1/Contract No. EP-S5-06-01

Revision Number: 0
Prepared: 3/10/2017

Approved By:

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Rachel Grand, Site Manager Date

_____

Theresa Rojas, Program Quality Manager Date

In Vitro Bioaccessibility Sampling in Residential Areas

1.1 Purpose

This document describes the soil sampling process to be followed when sampling residential properties for the *In Vitro* Bioaccessibility Study.

1.2 Scope and Applicability

This document describes the soil sampling process to be followed by CH2M when sampling residential properties. The document discusses steps that must occur during sampling. This document should be reviewed by the field project team prior to working in the field.

Sampling will be performed using an incremental sampling tool.

1.3 Equipment

- Incremental sampling tool
- Decontamination kits: distilled water, detergent solution, spray bottles, and paper towels
- Laboratory-supplied bottleware
- Clean, unused garbage bags
- 5-gallon buckets
- Stainless-steel spoons

1.4 Procedures

1.4.1 Surface Soil Sampling

One 30-point composite from one yard area per property will be collected. Aliquots collected at equal spacing and from the same depth interval (0 to 1 inch) should be obtained from one yard area, preferably from the yard where there is the most evidence of children playing. Aliquots will be collected using a clean, decontaminated incremental sampling tool in order to collect the same amount of material from each aliquot. Each aliquot should be collected away from influences of the drip zone and any other painted surfaces. It should also be noted if there is evidence of the soils being amended with phosphate (*does it appear that the property has been treated with fertilizer?*). Samples should not be collected from garden areas to avoid phosphate from fertilizers that affect the reliability of the analytical results.

1.4.2 Sample Mixing

Composite samples should consist of discrete aliquots of equal amounts of soil. Collect the soil from each aliquot into one clean container, such as a stainless-steel bowl, and mix thoroughly. Larger debris, organic litter, and sod should be removed from the composite sample. Once the sample is homogenized, place in the appropriate sample container. The sample can then be sent to the laboratory. Dispose of remaining sample volume in the

From U.S. Environmental Protection Agency. 2003. *Lead-Contaminated Residential Sites Handbook.* August.

general location from where it was collected, containerize, or archive, depending on the requirements of the project.

1.4.3 Sample Interval

Samples will be collected from 0 to 1 inches of soil below the organic litter and sod. Composites should consist of aliquots collected from the same depth interval.

1.5 Quality Assurance/Quality Control

- Ensure samples are not collected in drip zones.
- Ensure samples are not collected from garden areas.
- Ensure samples are not collected from properties amended with phosphate.

1.6 Attachments

U.S. Environmental Protection Agency. 2015. *Guidance for Sample Collection for In Vitro Bioaccessibility Assay for Lead (Pb) in Soil.* March.

1.7 References

U.S. Environmental Protection Agency. 2015. *Guidance for Sample Collection for In Vitro Bioaccessibility Assay for Lead (Pb) in Soil.* March.

United States
Environmental
Protection Agency

OSWER 9200.3-100

Guidance for Sample Collection for *In Vitro* Bioaccessibility Assay for Lead (Pb) in Soil

March 2015

Table of Contents

Guidance for Sample Collection for *In Vitro* Bioaccessibility Assay for Lead (Pb) in Soil

1.0 Terminology and Application

Definitions:

Absolute Bioavailability (ABA): Fraction of an ingested dose of lead that is absorbed from the gastrointestinal tract and enters the blood and tissues.

Relative Bioavailability (RBA): Ratio of the absolute bioavailability of lead in soil to that of a water soluble reference lead compound (lead acetate).

***In Vitro* Bioaccessibility (IVBA):** Fraction of total amount of lead in a soil sample that is soluble in a gastric-like (i.e., low pH) extraction medium.

The purpose of this document is to provide guidance on the collection of soil samples for measurement of lead IVBA (SW-846, Method 1340) (U.S. EPA, 2013c). The IVBA assay is used as a rapid and inexpensive method for predicting soil lead RBA (U.S. EPA, 2007c). Estimates of lead RBA are used to adjust bioavailability parameters in lead risk assessment models used in site risk assessment (e.g., Integrated Exposure Uptake Biokinetics [IEUBK] model for Lead in Children) (U.S. EPA, 2013a). Soil lead RBA is dependent on physical and chemical properties of the lead in soil and co-occurring elements at any particular site or location within a given site. As a result, site-specific estimates of soil lead RBA that provide representative coverage of the site are recommended for increasing confidence in estimates of risk related to site-specific lead exposures. Sampling plans for estimating soil lead RBA with the IVBA assay should provide a statistically robust estimate of RBA for decision units at the site. Typically, this can be achieved by measuring IVBA in a statistical subsample of soils collected as part of the sampling plan for estimating exposure point concentrations (EPCs) for soil lead. This guidance provides recommendations for data collection requirements, sampling material handling, QA/QC requirements, and health and safety requirements for assessments of site-specific soil lead RBA with the IVBA assay.

2.0 Procedure

Data Collection Requirements: A sampling plan for a site should be developed that considers potential soil exposure pathways for the site and any existing site data; for example, if the site is a residential area, then evaluation of exposure pathways in children's play areas, gardens, and the drip lines of homes should be given special attention (U.S. EPA, 2003a). If existing sampling data are available for a site, the information could assist in targeting the sampling locations where there is likely exposure to these contaminated areas.

Typically soil samples are collected, submitted for metals analysis, and the samples are archived while data are collected and reviewed. Based on the analytical results, a subset of the samples is selected for IVBA assay. At other sites, sample locations could be identified in the sampling plan and IVBA samples collected and analyzed without previous knowledge of lead concentrations at the site, although total metal analysis should be collected and conducted concurrently.

X-ray fluorescence (XRF) could be used to screen samples in the field because there is significant cost saving related to time and financial resources by eliminating the collection of samples that do not meet *a prior* criteria for IVBA analysis. There are many advantages of field screening for lead and other metals

including a reduction of both laboratory and field work. Soils with little to no metals are not collected, shipped, or processed by laboratory staff. Large fluctuations in soil lead concentrations within a site when determined by XRF in the field could be used as justification for collection of additional samples in order to form composites samples in the laboratory. The use of the XRF would allow samplers to immediately collect additional samples which may not be possible following laboratory analyses. Field screening with XRF therefore reduces the turnaround time required to generate IVBA results and reduces the need for additional field deployments as well as generating much less waste (fewer sample reduces shipping cost, processing time, number of analyses, and analytical waste). Field operators of portable XRF instruments should ensure they are following appropriate protocols to obtain reliable results (SW-846, Method 6200, U.S. EPA, 2007b).

When collecting samples for *in vitro* bioaccessibility assay, it is important to note site and sample medium characteristics that may indicate differences in the bioavailability of the lead or indicate that interferences might be present. For example, the lead IVBA assay (SW-846, Method 1340) may not reliably predict RBA of lead in soils that have been amended with phosphate (Scheckel et al., 2013). If phosphate at a site is a concern, it would be worthwhile to analyze the samples for the phosphate concentration. When collecting soils from residential properties it may not be advisable to make composite soil samples from a garden (potentially fertilized with phosphorus) with the surrounding property. Likewise it may not be advisable to composite soil samples from the drip line of a home (possible source of lead contaminated paint) with the remainder of the property (potentially different lead source).

In addition to total metals analysis and IVBA assay, the samples might also be submitted for lead speciation analysis and animal bioavailability studies. Lead speciation analysis is meant to determine the exact chemical form(s), or species, of lead in a sample, as opposed to the total lead concentration. Speciation analysis may be informative in explaining variability in IVBA across the site, identifying sources of contamination of the soil, and assessing the potential mobility of lead in the soil. While IVBA assay is meant to be a faster and less expensive alternative to *in vivo* animal bioavailability studies, there may be cases (such as potential interference from soil amendment applications [e.g., phosphate], untested lead phases, etc.) when the animal study would be necessary. It is important to ensure that sufficient material is collected for each sample so that additional analyses could be performed. If additional analyses are determined to be necessary, such as lead speciation analysis or *in vivo* animal bioavailability studies, consultation with the Technical Review Workgroup (TRW) Lead Committee is recommended.

Prior to sampling, a determination must be made as to whether the soil is regulated or quarantined by the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS)/Plant Protection and Quarantine (PPQ) (USDA, 2014). Take special care to segregate regulated or quarantined soil samples from the non-regulated or non-quarantined samples. To determine if the soils collected are regulated or quarantined contact the State Plant Health Director (http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/planthealth?1dmy&urile=wcm%3apath%3a%2Faphis_content_library%2Fsa_our_focus%2Fsa_plant_health%2Fsa_program_overview%2Fct_sphd).

Number of Samples: The number of samples to collect and analyze for IVBA will depend on the Data Quality Objectives (DQO) for the study. Factors that should be considered in estimating the number of samples include:

- goals of the RBA assessment;
- size and characteristics of the decision units at the site;
- expected variability in RBA within decision units, based on available data or bounding assumptions (U.S. EPA, 2007d); and
- acceptable limits on decision errors.

Project managers should consult with U.S. EPA "Guidance on Systematic Planning Using the Data Quality Objectives Process" or other appropriate guidance when developing DQOs (U.S. EPA, 2006).

In general, sample size estimates for RBA assessments can be based on the same types of power analyses used to evaluate statistical hypotheses in estimating EPCs at decision units (DUs) (see Appendix A). To reduce the cost of analyzing numerous discrete samples, an incremented sampling plan may be a cost effective approach (ITRC, 2012).

Sampling Depth: The appropriate sampling depth for a site will depend on the expected exposure pathway for a site. For most scenarios involving exposure to contaminated surface soil, EPA recommends a sampling depth of the top 0–1 inches of soil below organic litter and sod for lead exposure analysis (http://www.epa.gov/superfund/lead/ieubkfaq.htm). With this rather shallow sample depth it could be challenging to obtain sufficient sample mass for discrete samples especially if the material is particularly course. Incremental composite sampling can provide larger masses for shallow samples. If there are other exposure scenarios for a site, other sampling depth intervals that would represent these scenarios should be collected.

Sample Preparation: To help ensure that sufficient sample material is available for analysis, the field samplers should consider sieving the material in the field to remove larger debris. Sieve screens No. 4 (4.72 mm) or No. 10 (2.0 mm) would be sufficient for removing larger debris in the field.

Sample Mass: For metals analysis, SW-846 recommends that a minimum of 200 g of soil be collected and 2 g of sample be used for the digestions (SW-846, Chapter 3 Inorganic Analytes, Table 3-2, U.S. EPA, 2007a). Method 1340 specifies that 1 g of dried and sieved soil sample be used for IVBA assay for lead for a single replicate (U.S. EPA, 2013c). Additional replicates may be required if the assay does not meet performance specifications for IVBA. The amount of sample required will depend on the particle size distribution of the soil and the moisture content of the soil following course sieving in the field. If the samples will be submitted for animal bioavailability studies or speciation analysis, the laboratories that will be conducting these analyses should be consulted on the amount of sample materials they require to determine the sample mass needed. For further assistance in determining the sample mass for *in vivo* bioavailability and *in vitro* bioaccessibility assays, please contact the TRW Lead Committee.

Selection of Samples for IVBA: As stated previously, samples for IVBA assay can be designated as part of the sampling plan for estimating EPCs, or they can be selected based on the results from XRF field screening or total metals analysis. The strategy used to select samples for IVBA assay from XRF results or total metals data will depend on the intended use of the IVBA data. If the intended use is for screening, it may be appropriate to select only those samples that have lead concentrations exceeding the risk-based

concentrations used in screening. If the IVBA data are to be used to estimate risk for the site or a DU at the site, a representative statistical subsample should be selected. Samples selected for IVBA assay should have a total lead concentration less than 50,000 mg/kg (SW-846, Method 1340). If the *in vitro* bioaccessibility assay needs to be performed on a sample with a concentration greater than 50,000 mg/kg, the lab performing the assays should be informed of the samples concentrations so that the amount of soil used in the IVBA assay can be adjusted to be within the appropriate lead concentration range.

3.0 Sampling Materials and Handling

Sample Containers: The analytical laboratory/program that will be conducting the metals analysis should be consulted about the appropriate sample container and size required. For the *in vitro* bioaccessibility assay there are no specific sample container requirements. If no sample container is specified by the metals analysis laboratory, then appropriate containers include glass jars, wide-mouth HDPE jars, plastic zippered bags, or any other container that is clean and free of contaminants can be used. A single one-gallon plastic zippered bag should provide sufficient sample material for at least the metals analysis and *in vivo* bioaccessibility assay for most soils. Two-gallon plastic zippered bags may be required for sandy soils and soils with rocks passing through the sieve in the field. If using wide-mouth HDPE jars, a 1000-mL jar should provide sufficient sample, but collect multiple jars per sample if the soil is particularly course. There will be considerable cost reduction using plastic zippered bags compared to HDPE bottle (both cost of sample containers and shipping).

Sampling Equipment: Collection of surface soil samples may be accomplished with a stainless steel cylindrical punch which will capture a constant diameter core for the sampling depth of interest. Sampling using a kick-style cylindrical punch may reduce sample time in the field due to the ease of use. Kick-style punches are not recommended for sandy soils because the soil readily falls out of the probe. Likewise soils with heavy clay content or rocks are not recommended due to the difficulty in removing clay soils from punch and rocky soil will be rejected at the soil surface. For these reasons using plastic or stainless steel spades, trowels, or spoons may be preferable but the sampler should ensure that a sample is collected evenly across the sampling depth. Once the samples are collected, they should be placed in suitable containers for shipment. Any equipment that is not disposable should be thoroughly decontaminated and appropriately stored after sampling. If the exposure pathway being investigated requires deeper sampling depths than 0–1 inches, equipment such as augers, split spoon samplers, and backhoes may be necessary (U.S. EPA, 2000). If sampling at depth, care should be taken during sampling to account for any soil compaction as a result of sampling.

Labeling, Shipping and Storage Temperature, and Hold Times: Sample ID numbering, labeling, documentation, and chain of custody should follow the requirements of the analytical laboratory/program that will be conducting the metals analysis. The samples may be shipped at ambient temperature unless specified otherwise by the analytical laboratory/program.

EPA recommends a hold time of 6 months for metals samples. EPA 9200.2-86 recommends that all samples be archived after metal analysis and retained for further analysis, including *in vivo* bioavailability assay, for 6 months (U.S. EPA, 2012). The samples may be stored at ambient temperature unless specified otherwise by the analytical laboratory/program.

Laboratory Sample Preparation: Once in the lab, the samples should be blended and completely dried at <40°C in an air-drying oven for approximately 5 days to a constant mass. After drying, any clumps in the sample should be gently broken and then fine sieved. However, samples should not be ground by ball

mill or any other grinding method which could result in reduction in the particle sizes of the collected soils.

To ensure composite samples are representative of all of the component locations, the entire composite sample should be processed (i.e. dried and fine sieved). Following sieving, each sample should be thoroughly mixed using ASTM standard D6051-96 (2006) or ITRC Incremental Sampling Methodology (2012) and then transferred to a suitable storage container (U.S. EPA, 2013b).

Total metals analysis and other analyses should be conducted on the same dried, sieved, and homogenized sample material that will also be used for the *in vitro* bioaccessibility assay. To split a sample into equivalent aliquots for the different analyses, the processed soil should be passed through a riffle splitter and the aliquots collected in clean, 250 ml high-density polyethylene bottles (U.S. EPA, 2003b). Samples that have been dried and sieved can be submitted for total metals analysis, metals speciation, IVBA assay, and *in vivo* animal bioavailability studies but should not be used for analysis of other contaminants of concern.

4.0 Quality Assurance/Quality Control

The field samplers should consult with the metals analysis laboratory/EPA program to determine in advance the requirements for blanks, duplicates, and matrix spikes for the metals analysis samples. For the IVBA assay, Method 1340 does not require field blanks, field duplicates, or matrix spikes to be prepared or collected by field samplers. Material for the matrix spike and duplicates for Method 1340 can be taken from the samples at the laboratory's discretion and will not require that samplers collect and designate separate matrix spike and duplicates in the field.

Samplers should take thorough field notes and should retain any photographs taken, logbooks, and notes following the sampling event. The field group should make note of any differences in the media between the sample locations and indicate if there is any potential interferents (i.e., phosphate amended soils) present.

5.0 Health and Safety

When working with potentially hazardous materials, follow U.S. EPA, Occupational Safety and Health Administration (OSHA), and any contractor's corporate health and safety procedures, in addition to the procedures specified in the site-specific Health and Safety Plan.

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Appendix A

Guidance for Sample Collection for *In Vitro* Bioaccessibility Assay for Lead (Pb) in Soil

Objectives:

Predicting the minimum sample number needed to estimate the RBA-adjusted mean soil Pb concentration involves evaluating and setting limits on the probability of two types of errors. We define the null hypothesis as:

H_0: RBA-adjusted mean soil Pb concentration ≥ Risk based concentration (RBC)

And the alternate as:

H_1: RBA-adjusted mean soil Pb concentration < Risk based concentration (RBC)

A Type 1 error occurs if we reject H_0 when it is true; we conclude that the RBA-adjusted mean soil Pb concentration is less than the RBC, when it is actually greater than the RBC. A Type I error could result in underestimating risk at the site.

A Type 2 error occurs if we accept H_0 when it is false; we conclude that the RBA-adjusted mean soil Pb concentration exceeds the RBC, when it is actually less than the RBC. A Type 2 error could result in overestimating risk at the site.

The objective of a sample number assessment is to identify sample numbers that are expected to satisfy specified requirements for Type 1 and Type 2 error rates. These error rates depend on several factors:

- the difference between the mean soil Pb concentration and the RBC;
- the variability in the soil Pb concentration; and
- the mean and variability of the soil RBA at the site.

Larger sample numbers will be required to achieve a given error rate when the actual RBA-adjusted mean soil Pb is closer to the RBA, or when variability (i.e., standard deviation) of the soil Pb concentrations or RBA at the site are higher.

Assumptions for calculating sample number:

An example of sample number calculation is presented here. Assumptions in the analysis are as follows:

1. The underlying distribution of measured Pb concentrations in discrete soil samples at the decision unit (DU) is lognormal (the incremental-composite sampling [ICS] design should collect adequate samples to ensure a normal distribution of the concentrations of multiple composites).
2. Distribution of measured RBA within a DU is normal (e.g., single source of Pb contamination and uniform soil characteristics). An analysis of IVBA measurements of soil RBA at 10 different sites, at which multiple IVBA measurements were made (range: 12–86 discrete samples per site), showed that the average coefficient of variation (standard deviation/mean) was 13% (range: 5–22) (update to EPA TRW, 2003 that included data from Bunker Hill).
3. The RBA-adjusted mean soil Pb concentration for the DU is:

$$Adjusted\ Mean\ PbSoil = Mean\ PbSoil \cdot \frac{Mean\ RBA}{0.8}$$

where PbS is the soil Pb concentration and 0.8 is the default values for RBA in the IEUBK Model.

4. For evaluating Type 1 error, we assume that the RBA-adjusted mean soil Pb concentration at the DU exceeds the RBC. For evaluating Type 2 error, we assume that the RBA-adjusted mean soil Pb concentration at the DU is below the RBC.
5. An acceptable Type 1 error rate is 5% (i.e., the probability of concluding that the RBA-adjusted mean soil Pb concentration is less than the RBC, when it is actually greater than the RBC, is equal to or less than 5%).
6. An acceptable Type 2 error rate is 20% (i.e., the probability of concluding that the RBA-adjusted mean soil Pb concentration is greater than the RBC, when it is actually less than the RBC, is equal to or less than 20%). We are typically less concerned about a Type 2 error than a Type 1 error (overestimating risk) than a Type 1 (underestimating risk).
7. The ICS design consists of *n*=C composites are collected at the DU, each composite consisting of *n*=I increments, and *n*=R composites are randomly selected for IVBA analysis.
8. The estimated mean soil Pb concentration for the DU is the mean of measured Pb concentrations of *n*=C composites.
9. The estimated mean RBA for the DU is based on the mean of measured IVBA of *n*=R composites.
10. Values assumed for soil Pb concentration, RBC, and RBA for evaluating Type 1 and Type 2 error rates are presented in Table A-1.

A Monte Carlo Simulation (MCS) was used to estimate Type 1 and Type 2 error rates. The MCS consisted of 10,000 random draws from soil Pb concentration and RBA distributions (see Table A-1) and calculation of 10,000 corresponding values for the mean RBA-adjusted soil Pb concentration. The Type 1 error rate is the number of means that are less than the RBC (divided by 10,000) when the assumed (true) concentration equals or exceeds the RBC (see Figure A-1). The Type 2 error rate is the number of means that are greater than or equal to the RBC (divided by 10,000), when the true mean is less than the RBC.

Predictions:

Type 1 and Type 2 error rates for various ICS designs are presented in Table A-2. The single composite design is equivalent to a discrete sampling design with *I*=n discrete samples per DU. The estimated probability distribution of the RBA-adjusted mean soil Pb concentration for the sampling design *C*=3, *I*=20, and *R*=1 is shown in Figure A-1. A plot of the Type 1 error rates corresponding to various combinations of *C*, *I*, and *R* is shown in Figure A-2.

As noted previously, error rates depend on the values selected for the various parameters listed in Table A-1. This is illustrated in Figure A-3 which shows the probability of rejecting H_0 as a function of increasing mean RBA-adjusted soil Pb concentration for a design in which 3 composites of 30 increments each are collected. When the mean soil Pb concentration is well below 400 ppm (<200 ppm), the probability of rejecting H_0 is 100% (Type 1 error = 0). Similarly, when it is well above 400 ppm (>600 ppm) the probability of rejecting H_0 is 0% (Type 2 error = 0). However, at a soil Pb concentration of 500 ppm, the probability of rejecting H_0 is 5%, even though the mean exceeds the 400 ppm RBA (Type 1 error = 5%).

Figure A-3 also shows the effect of variability in RBA on the Type 1 error rate. Three coefficients of variation are shown (0.15, 0.30, 0.50). If the coefficient of variation is 0.50 (RBA=0.6±0.30), rather than 0.15 (RBA=0.6±0.09), the Type 1 error rate at a 500 ppm mean soil concentration increases from 5% to 18%. In order to decrease the Type 1 error rate to an acceptable 5%, the number of increments in each of the 3 composites would have to increase from 20 to 60. If the coefficient of variation is 0.30 (RBA=0.6±0.18), a 5% Type 1 error rate can be achieved with 25 increments in each of 3 composites.

Conclusions:

1. If the mean RBA-adjusted soil Pb concentration is 500±500 ppm and the mean soil Pb RBA is 0.60±0.09, an acceptable Type 1 error (5%) is predicted with:
    a. 1 composite made up of 60 increments;
    b. 2 composites made up of 30 increments; or
    c. 3 composites made up of 20 increments.
2. If 3 composites of 20 increments are collected, RBA assessment of a single randomly selected composite would yield an acceptable Type 1 error rate. A minimum of 30 increments has been recommended (ITRC, 2012).
3. Higher variability in RBA will require a larger number of increments per composite to achieve an acceptable Type 1 error rate.
    a. If the RBA coefficient of variation is 0.30 (RBA=0.60±0.18), 25 increments would be needed per composite.
    b. If the RBA coefficient of variation is 0.50 (RBA=0.60±0.0.30), 60 increments would be needed per composite.
4. A larger number of increments will be needed if the actual mean soil Pb concentration is closer to the RBC, and fewer will be needed if the actual mean Pb concentration is further from the RBC.
5. In general, for most risk assessment applications, acceptable Type I error rate can be expected if ITRC (2012) recommendations are followed (30 increments per composite).

TABLE A-1. Parameter Values for Sample Number Calculation

Parameter	False Negative Assessment	False Positive Assessment	Basis
Soil Pb RBC (ppm)	400	400	OSWER screening level corresponding to P_{10}=5% (approximately)
Mean RBA-adjusted soil Pb concentration (ppm)[a]	500	300	Assumption Type 1 error = RBC x 1.25 Assumption Type 2 error = RBC x 0.75
Mean RBC-adjusted soil Pb standard deviation (ppm)	500[b]	300[b]	CV=1 for Bunker Hill soil (or dust)
Mean soil RBA	0.60	0.60	Site-wide median (U.S. EPA OSRTI TRW)
Soil RBA standard deviation	0.09[c]	0.09[c]	CV=0.15, based on median CV for 11 sites (TRW: Estimation of Lead Bioavailability in Soil and Dust: Update to the Default Values for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (11/02/11) plus Bunker Hill (CV=0.11)
IEUBK model default RBA	0.80	0.80	IEUBK Model

[a]RBA-adjusted mean soil Pb=Mean soil Pb x mean soil RBA/0.8, where 0.8 is the IEUBK Model default soil RBA
[b]Soil Pb distribution: lognormal (mean, SD).
[c]RBA distribution Normal (mean, SD, min, max), with min=0, max=1.

TABLE A-2. Error Rates for ICS Designs

Number of Composites for Pb Analysis (C)[a]	Number of Composites for IVBA Analysis (R)	Number of Increments per Composite (I)	Type 1 Error Rate (%)	Type 2 Error Rate (%)
1	1	10	29	14
1	1	20	18	8.2
1	1	40	9.0	3.1
1	1	50	6.6	2.0
1	1	60	4.1	1.3
1	1	80	3.2	0.5
2	2	10	18	8.1
2	2	20	8.5	3.3
2	2	30	4.5	1.3
2	2	40	2.6	0.5
3	3	5	22	10
3	3	10	13	4.8
3	3	20	4.6	1.3
3	3	30	1.8	0.5
3	1	5	23	10
3	1	10	13	5.4
3	1	20	5.3	1.5
3	1	30	2.3	0.6

[a]If we are interested only in estimating the mean soil Pb concentration (i.e., not the upper confidence limit of the mean), a single composite of *I*=n increments is equivalent to *I*=n discrete samples.

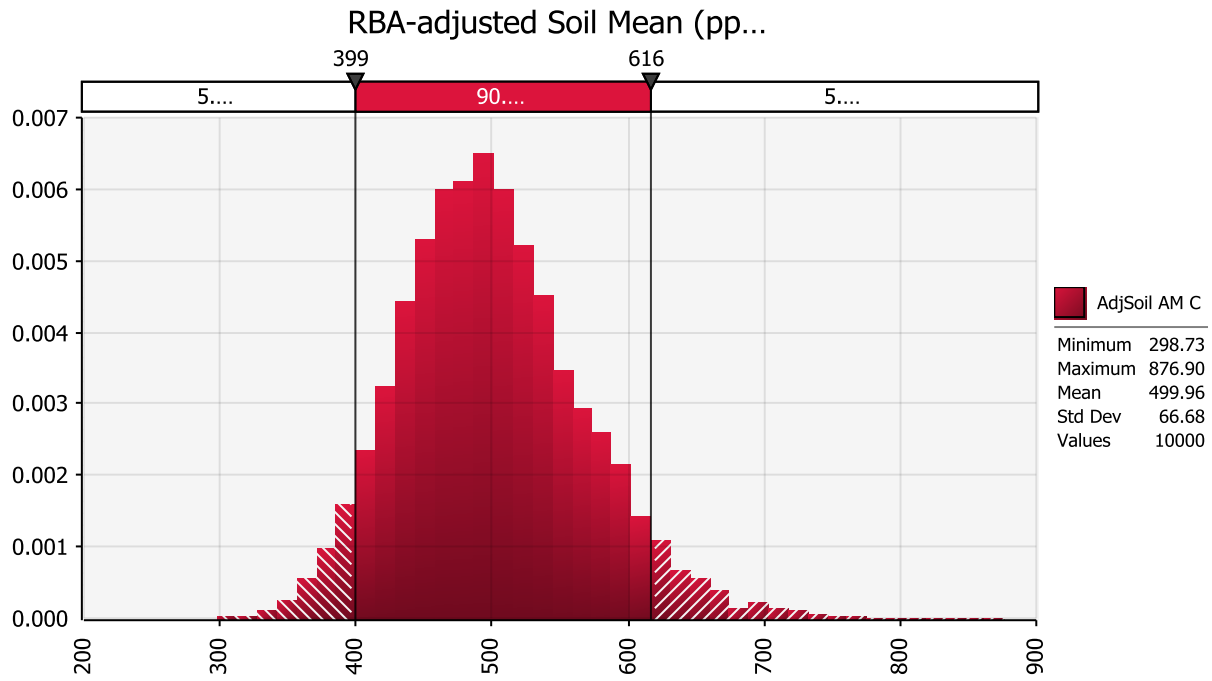


FIGURE A-1. Probability distribution (vertical axis) of estimated mean RBA-adjusted soil Pb concentration (horizontal axis) based on a 3 composite samples consisting of 20 increments with RBA measured on 1 randomly selected composite (C3xI20xR1). Cumulative distribution (percentile) is shown at the top of the graph. Actual soil Pb RBA is 0.60, actual mean soil Pb concentration is 500 ppm; RBC is 400 ppm. The probability of obtaining estimates that are less than 400 ppm (which would lead to Type 1 errors) is approximately 5%. In this case, a Type 2 error is not possible because the true mean exceeds the RBC.

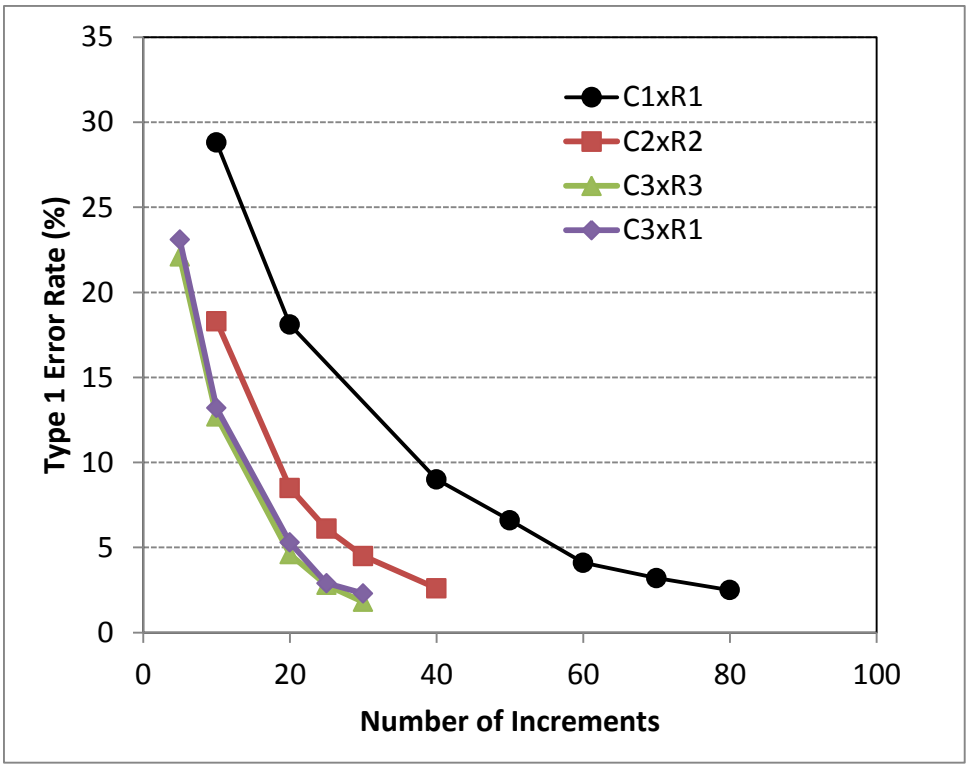


FIGURE A-2. Type 1 error rate (%) predicted for increasing number of increments for 1, 2, or 3 composite samples (20 increments per composite). Mean soil Pb RBA is 0.60±0.09, mean soil Pb concentration is 500±500 ppm; RBC is 400 ppm. The single composite design (C1xR1) is equivalent to a discrete sampling design with *I*=n discrete samples per DU.

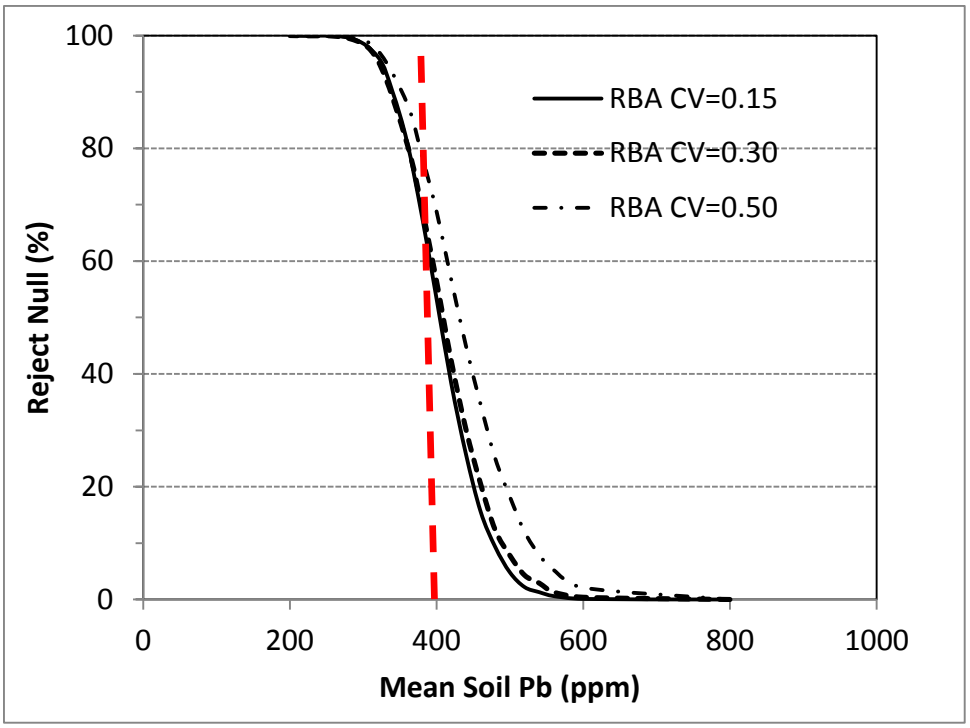


FIGURE A-3. Probability of rejecting H_0 as the mean RBA-adjusted soil Pb concentration increases when the coefficient of variation of RBA is 0.15 (RBA=0.60±0.09), 0.30 (RBA=0.60±0.18), or 0.50 (RBA=0.60±0.30). Soil Pb coefficient of variation is 1.0; RBC is 400 ppm. The area under the probability curve, to the right of the vertical line representing the RBC is the Type 1 error. Sample design is 3 composites of 20 increments per composite, with a single composite for RBA (C3xI20xR1).

Field Operating Procedure No. 4
Utility Clearance for Intrusive Operations

Old American Zinc Plant Superfund Site,
Fairmont City, St. Clair County, Illinois
Remedial Design
WA No. 224-RDRD-B5A1/Contract No. EP-S5-06-01

Revision Number: 0
Prepared: 3/10/2017

Approved By:

_____

Rachel Grand, Site Manager Date

_____

Theresa Rojas, Program Quality Manager Date

Utility Clearance for Intrusive Operations

1.1 Purpose

This document describes the utility markout/clearance process to be followed prior to completing any intrusive subsurface activities.

1.2 Scope and Applicability

This document describes the utility markout/clearance process to be followed by CH2M HILL, Inc. (CH2M) prior to any intrusive activities. The document discusses steps that must occur prior to mobilizing and steps that must occur during intrusive work.

This document should be reviewed by the field project team prior to working in the field. In addition, this document should be used to develop scopes of work for utility clearance subcontractors.

1.3 Procedures

1.3.1 Prior to Mobilizing to the Field

Prior to mobilizing to perform intrusive work, Illinois 811 (JULIE) must be called, and utility companies must mark their utility lines.

1.3.1.1 Public Utilities Under Illinois 811 (JULIE)

JULIE must be called (800.892.0123) prior to any intrusive work. JULIE members will be notified by JULIE and dispatch company representatives within 48 hours (2 business days) beginning at 8 a.m. and ending at 4 p.m. (exclusive of Saturdays, Sundays, and holidays recognized by the Statewide One-Call Notice System or the municipal one-call notice system). All requests for locates received after 4 p.m. will be processed as if received at 8 a.m. the next business day.

You may not begin your excavation before the dig start time of your ticket, even if all utilities have been marked. Excavation must begin within 14 calendar days of the initial locate request.

The following general information must be provided during the call:

- Your name, company, address, and phone and fax number where you can be reached.
- The name and phone number of the site contact.
- The county and city or county and unincorporated area of the township of the excavation.
- The location of the intrusive work, which may include, but is not limited to, address, cross street, lot numbers, etc. One shall provide either (1) appropriate section and quarter section grid information; (2) sufficient address or descriptive information to allow the establishment or drawing of a dig site polygon; (3) sufficient address, street, and cross-street information to allow for the determination of the appropriate section and quarter section grid(s); or (4) global positioning system coordinates for simple, single-site work areas for determination of a dig site polygon or appropriate section/quarter section during their locate request process through JULIE.
- The start date and time of the planned activities.

- The type and extent *(size of the excavation area)* of the work involved. Please indicate if the excavation area has been white-lined using white paint, flags, and/or stakes.
- The section/quarter sections when the above information does not allow the one-call system to determine this information.

While on the phone with JULIE, the following information should be collected and documented in the project files:

1. **Members Notified.** The identity of JULIE members notified will be provided to the caller. Retain a copy in the project files and keep it onsite while intrusive work is being performed.
2. **Case Reference Number.** An identification number associated with the call should be retained for future reference, if needed. Retain a copy in the project files and keep it onsite while intrusive work is being performed.

JULIE members are required to notify the contact person by fax or e-mail if they do not have any utilities at the work area. The site safety coordinator should retain a copy in the project records and keep it onsite while intrusive work is being performed.

All public utilities in the area where intrusive work is to be performed should be marked out on the ground by the utility locator using the American Public Works Association (APWA) Uniform Color Code (Attachment 1).

Utility locates are good for 14 calendar days, including the day the call was made. Extended tickets are available, and will be extended 14 calendar days from the extension. Extensions need to be requested 2 working days before the end of the original 14-day period. For more information, visit the website at www.illinois1call.com.

1.3.1.2 Private Utility Clearance

Private utilities must be cleared as follows:

1. The location(s) where intrusive work will occur should be identified during a site visit with the designated utility locator. The proposed areas where intrusive work will be performed should be pre-marked by CH2M before this site visit. It is important to consider access issues while pre-marking.
2. The utility locator should clear an area for intrusive work. An additional area (if possible) to be cleared by the utility locator is based on the work to be performed. When possible, the following areas will be cleared:
    - Boring: At some locations where utilities are congested, the boring location only will be cleared (i.e., only an “X” will be cleared). At other locations that are less congested with utilities, a 5-foot radius around the boring location may be cleared, allowing additional borings within that radius if refusal is encountered on the first attempt. This will be communicated on the utility clearance signoff sheet by the private utility locator. For borings that are located near certain lines (e.g., other water lines, etc.) and for which the property owner cannot pinpoint the line’s location, additional methods will be used to clear the location (see #4 under **Prior to Intrusive Work**).
3. The area that is cleared by the utility locator for intrusive work should include the marking of all utilities in the immediate area (at least a 10-foot buffer around the cleared area) using orange spray paint. If it is not possible to mark utilities, then a figure should be provided that will show the field team exactly where these utilities are located.
4. A utility clearance signoff sheet will be provided to CH2M after all areas, where intrusive work will be completed, have been cleared. The signoff sheet will document the location of all underground utilities and obstructions in the immediate area of the intrusive work (per #3, above). If the utilities could not be marked out on the ground, then a figure showing their location(s) should be provided with the signoff sheet.
5. The utility clearance is applicable for a 14-day period. Any intrusive work conducted after this 14-day period requires a new utility clearance.

1.3.2 Prior to Intrusive Work

The following should be completed before commencing intrusive work:

1. Verify that all public utility companies have identified the presence of utilities with marking paint or have provided a response back indicating the absence of utilities in the area. To verify what the utility markings on the ground indicate, use the color code in Attachment 1 (for public utilities). **If utilities have not been marked or a negative response has not been confirmed, do not perform intrusive work in that area. Sometimes utility companies do not have underground utilities near your dig area. In this case, check the JULIE Positive Response site at http://newtin.julie1call.com/newtinweb/ticketinfo.nas to ensure the utility company has cleared your dig site or responded to your call.**
2. Review the utility clearance signoff sheet to verify that the location has been cleared for intrusive work if private utilities are present. Also, review the markings on the ground and compare this against the document provided by the utility locator that indicates the utilities in the area. **If markings are missing or the signoff sheet or figure provided indicates that cleared areas contain utilities, do not perform any intrusive work until the utility locator has been contacted and has marked the missing utility line(s) or evaluated whether the cleared area contains utilities.**
3. Review the utility clearance documentation with the subcontractor during the tailgate meeting (if applicable).
4. Use other methods to identify utilities if there are numerous utility lines around the area and/or lines that cannot be clearly located where intrusive work is to be performed. If possible, hand digging or hand augering will be performed down to 4 feet below ground surface (bgs). Another method would involve the use of an air knife to bore 4 feet bgs with the use of high-pressure air that would not damage any utilities encountered.
5. Intrusive work can only be performed in the cleared area. If intrusive work needs to be performed outside of the cleared area, then the appropriate utility locator(s) must clear the new location. If the new area cleared involves private utilities, then an addendum to the initial utility clearance signoff sheet should be provided.
6. While performing intrusive work, monitor for signs of an encounter with a utility line. The signs include encountering fill material such as gravel, sand, or other fill material; warning tape; plastic; or metal. If, during the course of digging, a utility line has been exposed, it is your responsibility to inspect and support the utilities before backfilling. You must inspect utilities for any damage which could include the pulling or kinking of the utility or damage to the protective coating or covering. If damage exists, it is your responsibility to immediately notify the utility company directly. If there is any question about possible danger, we recommend contacting the utility company for instructions. Illinois rules only require you to contact Illinois 811 if you have reason to believe marks are incorrect or missing. You should also plan your work to minimize damage to markings.
7. If it is believed that a utility was struck, stop work and evacuate everyone if you have created a dangerous situation. If so, call 911 immediately and keep the area clear. Also, call the utility you hit and make them aware of what has happened. They can be reached by contacting JULIE at 800.892.0123
8. If refusal occurs while boring and it is believed **not** to be related to a utility, then advancement will be tried at another location within the cleared yard area.

1.3.3 What is my responsibility while I am digging?

After markings have been made, you are required to maintain a minimum horizontal (side to side) clearance of 2 feet (24 inches) between an unexposed utility and the cutting edge or point of any power operated excavating or earth-moving equipment. For example, if the markings indicate a 6-inch pipe is buried, the hand-dig zone is 54 inches wide (6 inches + 24 inches on each side of the mark). If excavation is required within the hand-dig zone, then the excavation must be performed very carefully, with hand tools, and without damage to the utility or undermining of lateral support. Please note that utility depths may vary due to installation practices, changes in

the grade, erosion, and other variables. Therefore, any depth readings given by a locator, if given at all, are only an indication of the approximate depth of the utilities.

1.4 Key Checks

Review checks outlined in the procedures above.

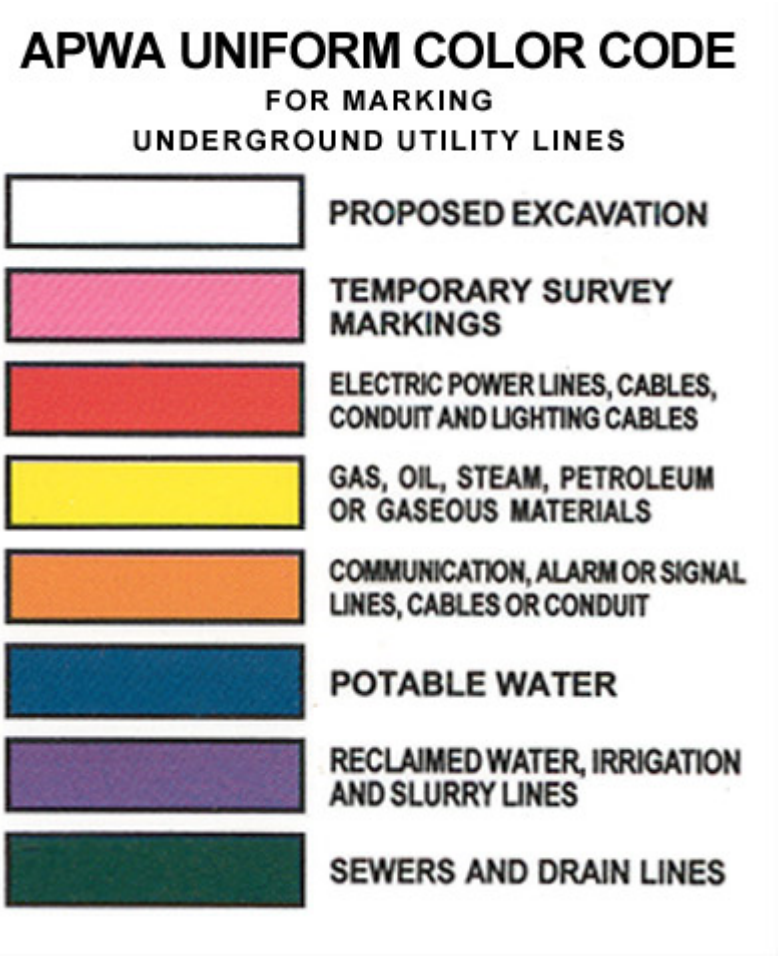
1.5 Attachments

APWA Uniform Color Code of Marking Underground Utility Lines

1.6 References

None.

Attachment 1



Field Operating Procedure No. 5 Sample Handling and Chain-of-Custody Procedure

Old American Zinc Plan Superfund Site,
Fairmont City, St. Clair County, Illinois
Remedial Design
WA No. 224-RDRD-B5A1/Contract No. EP-S5-06-01

Revision Number: 0
Prepared: 3/10/2017

Approved By:

_____

Rachel Grand, Site Manager Date

_____

Theresa Rojas, Program Quality Manager Date

FIELD OPERATING PROCEDURE FOP-05

Sample Handling and Chain-of-Custody Procedure

1.1 Purpose

The purpose of this field operating procedure (FOP) is to provide a definition of "custody" and describe protocols for documenting the transfer of custody from one party to the next (e.g., from the site to the laboratory). A documented custody trail is established through the use of sample tags and a U.S. Environmental Protection Agency (EPA) chain-of-custody form that uniquely identifies each sample container, and who has possession of it from the sample's origin to its final destination. The chain-of-custody form also describes the sampling point, date, time, and analysis parameters.

1.2 Scope

Sample personnel should be aware that a sample is considered to be in a person's custody if the sample meets the following conditions:

- It is in a person's actual possession.
- It is in view after being in a person's possession.
- It is locked up so that no one can tamper with it after having been in physical custody.

When samples leave the custody of the sampler, the cooler must be custody-sealed and possession must be documented.

Data generated from the use of this FOP may be used to support the following activities: site characterization, risk assessment, and evaluation of remedial alternatives.

1.3 Equipment and Materials

- Computer with Scribe software loaded
- Laser printer with paper (8.5 × 11 inch) and ink cartridge (black)
- EPA Region 5 Sample Tag
- Scribe generated tag label (2-inch x 4-inch adhesive labels)
- Indelible black ink pen

1.4 Procedures and Guidelines

For the Old American Zinc Plant Superfund Site Remedial Design, the following sample management tasks will be completed for each sampling task:

- **Preconstruction residential soil sampling:** Scribe will be populated by the sample manager. The sample manager will prepare chains of custody and tags.
- **Preliminary Data:** Preliminary electronic data deliverables will automatically be loaded into the EQuIS database and screened by the project chemist. The project chemist will send the data via email to the project team.

1.4.1 Chain-of-Custody Forms

The chain-of-custody form must contain the following information:

- CASE NUMBER/CLIENT NUMBER: If a Contract Laboratory Program (CLP) laboratory is used, then enter the case number provided by EPA's Regional Sample Control Coordinator (RSCC). If the CLP is not used, enter the Special Analytical Services (SAS) number provided by CH2M HILL Inc.'s (CH2M's) Sample and Analytical Coordinator.
- EPA REGION: Enter Region "5".
- CERCLIS ID: FOR OAZ, USE "IL0000034355".
- SPILL ID: For OAZ, use "TBD".
- SITE NAME/STATE: "OAZ", "IN".
- PROJECT LEADER: Enter the CH2M site manager.
- ACTION: For OAZ, choose "Remedial Design".
- SAMPLING CO.: "CH2M".
- SAMPLE NO.: This is the unique number that will be used for sample tracking. For CLP, this number is taken from a block of numbers assigned by the EPA RSCC. For non-CLP, the CH2M Sample and Analytical Coordinator will assign this number.
- MATRIX: Describes the sample media (e.g., soil, water, etc.).
- SAMPLER NAME: The name of the sampler or sample team leader.
- CONCENTRATION: Low (L), Low/Medium (M) or High (H).
- SAMPLE TYPE: "Grab" or "Composite".
- ANALYSIS: This indicates the analyses required for each sample.
- TAG NO.: This number appears on the bottom of the sample tag and includes a prefix ("5") followed by a series of numbers. The entire number must appear on the chain-of-custody form.
- PRESERVATIVE: Document what preservative has been added to the sample (e.g., "HCl", "Ice Only", "None").
- STATION LOCATION: This is the CH2M Station Location Identifier.
- SAMPLE COLLECT DATE/TIME: Use military time.
- QC TYPE: This is for field QC only, and includes field duplicate, field blanks, equipment blanks, and trip blanks.
- DATE SHIPPED: The date that samples are relinquished to the shipping carrier.
- CARRIER NAME: (e.g., "FedEx").
- AIRBILL: Airbill number used for shipping.
- SHIPPED TO: This is the laboratory name and full address, including the laboratory contact. If the contact is not known, use "Sample Custodian".
- CHAIN-OF-CUSTODY RECORD FIELDS: The sampler's signature must appear in the "Sampler Signature" and the "Relinquished By" fields. The date and time (military time) must also be included. If additional personnel were involved in sampling, their signatures should appear in the "Additional Sampler Signature(s)" field.

Although the samples are "relinquished" to the shipping carrier, the shipping carrier does not have access to the samples as long as the shipping cooler is custody sealed. Consequently, the shipping carrier does not sign the chain-of-custody form.

- SAMPLE(S) TO BE USED FOR LABORATORY QC: This identifies which samples are to be used for matrix spike/matrix spike duplicate analyses.
- INDICATE IF SHIPMENT FOR CASE IS COMPLETE: Use "Y" or "N".
- CHAIN-OF-CUSTODY SEAL NUMBER: Record the custody seal numbers that appear on the Region 5 custody seals that can be found on the shipping container. There is usually a minimum of two per shipping container.

1.4.2 Sample Tags

Each sample container will be identified with a uniquely numbered sample tag issued by EPA Region 5. Each tag will contain the following information:

- Case/SAS number
- The unique sample number for sample tracking
- CH2M station location (i.e., the sample identifier)
- Date of sampling
- Time the sample was collected (in military time)
- All parameters for which the sample will be analyzed
- Preservative used (if any)
- Sample type (grab or composite)
- Sample concentration (low, medium, high)
- Sample matrix (soil, water, etc.)
- The signature of sample team leader
- Identification when sample is intended to be used by the lab for matrix spike/matrix spike duplicate

1.5 Attachments

- Attachment 1: User Manual for Scribe CLP Sampling

1.6 Key Checks

- All sample containers must be properly tagged.
- Each cooler must have a chain-of-custody form and the samples in the cooler (as identified by the sample tags) must match what is on the chain-of-custody form.
- Verify completeness of the chain-of-custody form and consistency with field records.
- Each chain-of-custody form must be properly relinquished (signature, date, time).
- The custody seal numbers must be written on each chain-of-custody form.
- The shipping cooler must be custody sealed in at least two places.

1.7 References

None.

FOP-05, Attachment 1
User Manual for Scribe CLP Sampling

ERT

USER MANUAL for

SCRIBE CLP SAMPLING

TABLE OF CONTENTS

Modification Date: June 11, 2010

INTRODUCTION

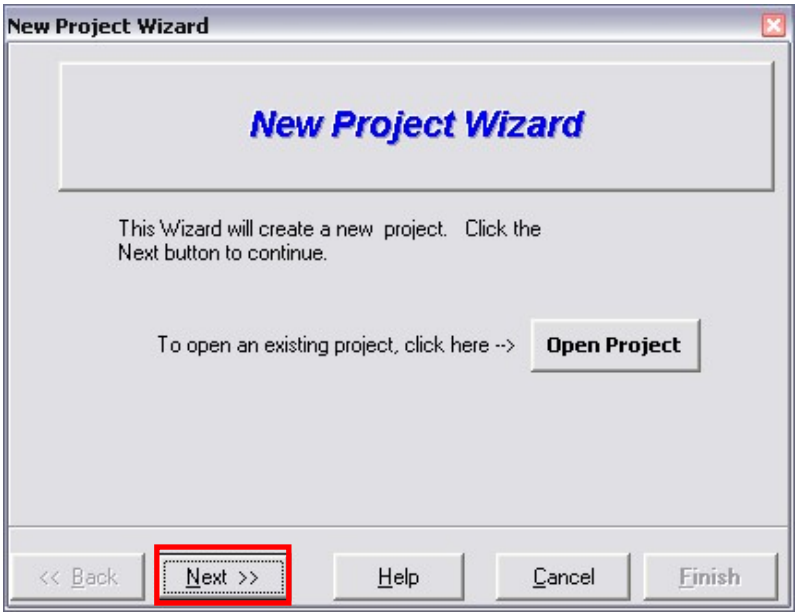
The intent of this User Guide is to provide a basic overview of how to use Scribe to create a new sampling project and manage samples collected for the EPA's Contract Lab Program (CLP). Scribe provides support for CLP sample documentation including the CLP Chain of Custody (COC) reports and the CLP XML format.Query. This document also assumes that the user is already familiar with the Scribe application for sampling. Otherwise, please refer to the Scribe User guides for detailed Scribe application instructions.

Create a New Project

New Project Wizard

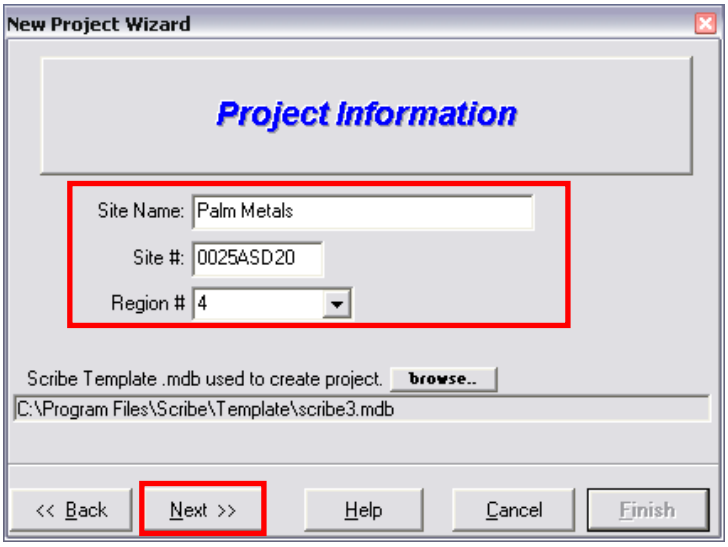
If you are starting Scribe for the first time after installation, the New Project Wizard will run automatically. Otherwise, to create a new project in Scribe:

1. Click on '**File'**.
2. Select '**New Project'**.
3. A New Project Wizard window is displayed.



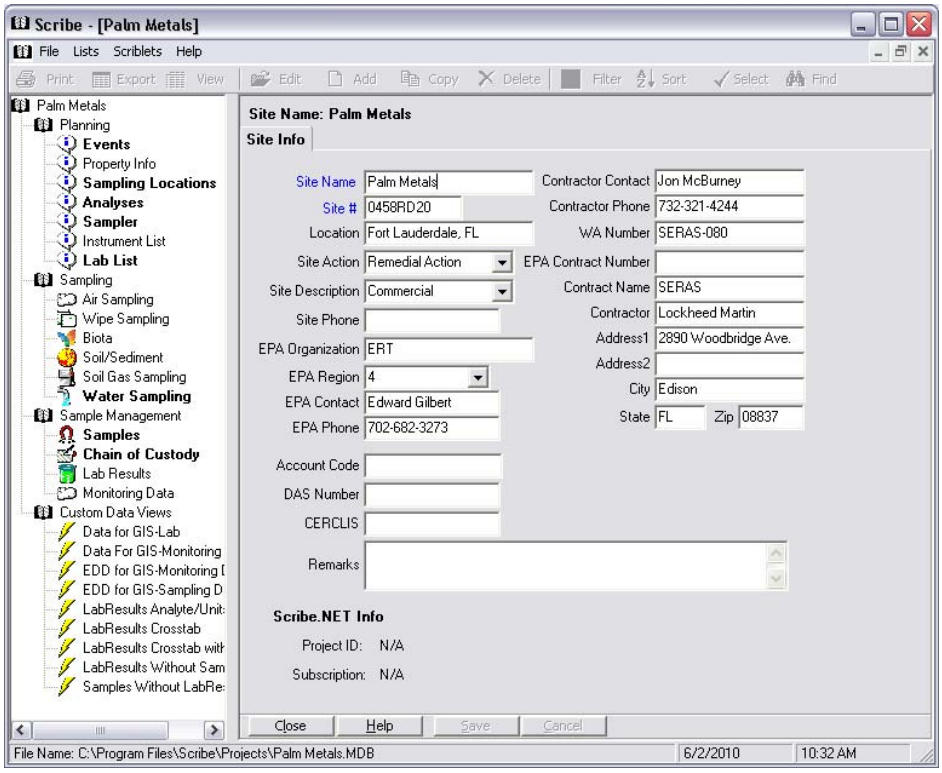
4. Click '**Next'** to continue.

5. Enter the Project Information.



6. Enter the **Site Name**, **Site #** and **EPA Region #**.

7. Click '**Next**' and then click '**Finish**' to create the new project.



The New Project Wizard closes and the "**Site Info**" screen displays. ONLY the field names in **BLUE** are required but we recommend completing as many fields as possible.

CLP SAMPLING IN SCRIBE

CLP Samples

CLP Analyses

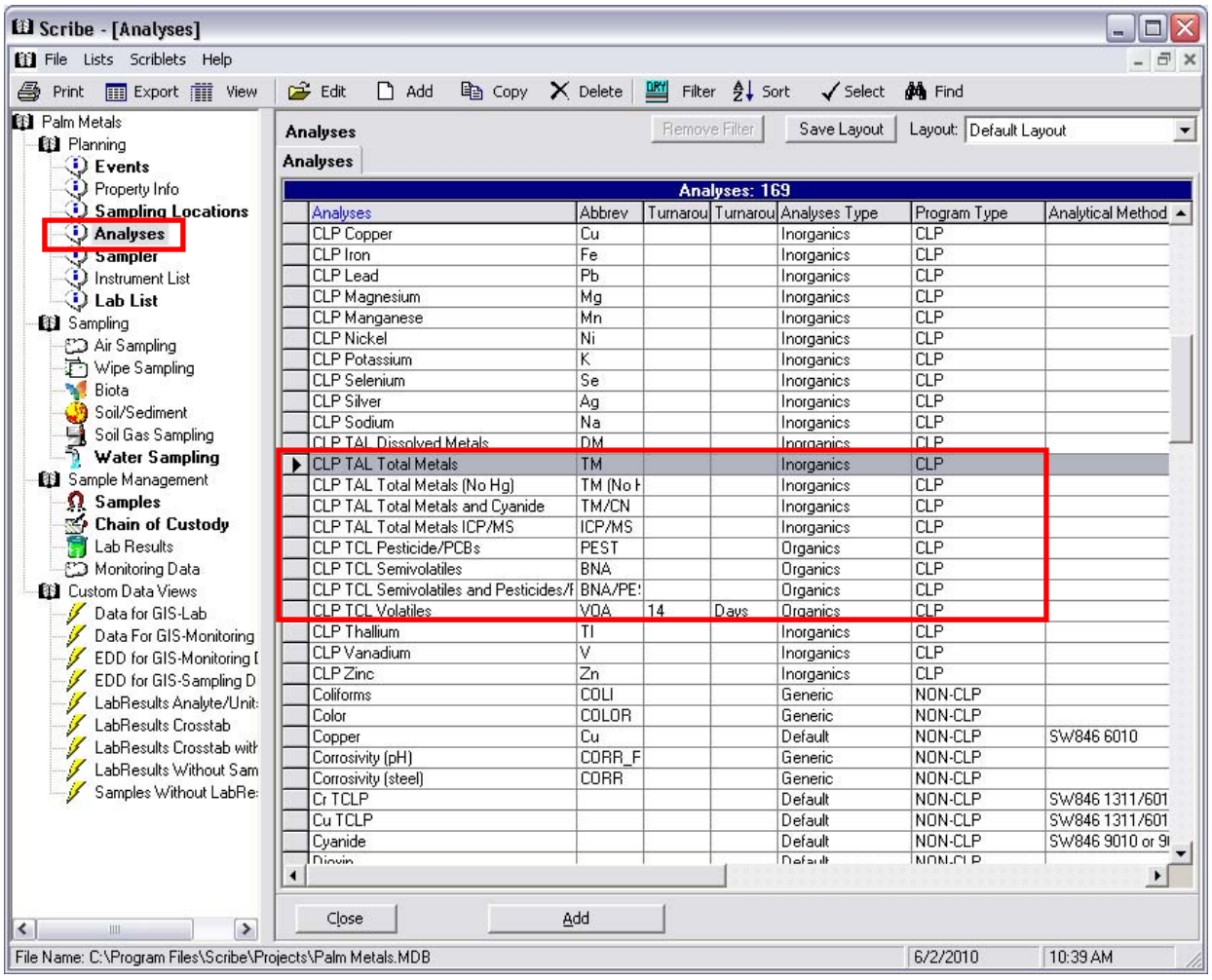
The Scribe Analyses List now includes CLP Analyses. To view or modify the list:

1. Click on "**Analyses**" in the left Navigation Pane. This section is used to manage a list of Analyses including the Program Type and Analysis Type. For example:

   Analysis: CLP TAL Total Metals

   Program Type: CLP

   Analyses Type: Inorganics



CLP/Tag Settings

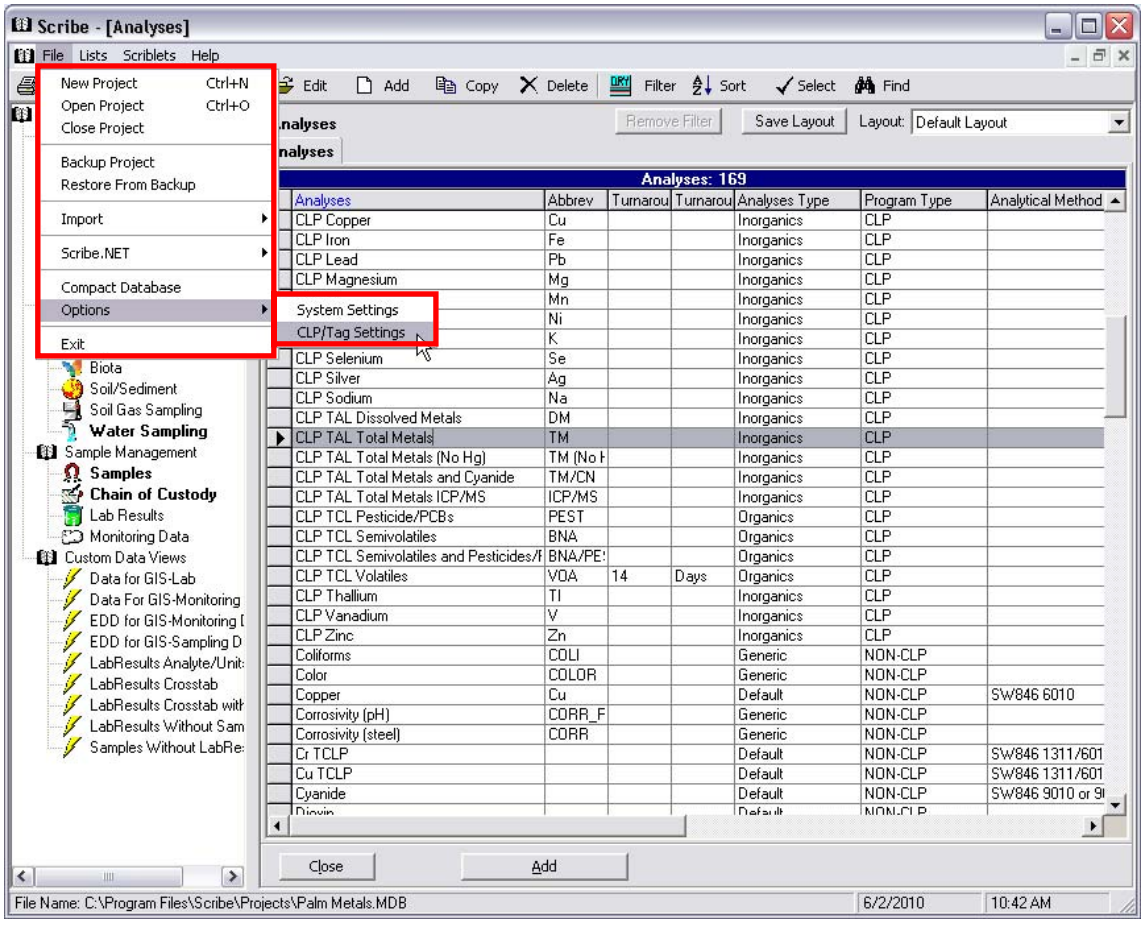
A new feature included with CLP Analyses is the ability to set defaults for the CLP Tags. When a CLP Analysis is selected for a sample, Scribe will assign a CLP Sample number. You can set the **Next CLP Sample number** and **Next Tag number** similar to a sample mask but not exactly.

The CLP Sample # and the Tag # is a field that will update as Samples are added to Scribe. This number is a DISPLAY of the Next number to be assigned. It is editable so that you may customize the next CLP Sample Number that you would like Scribe to assign to your samples.

The numbers auto-increment as samples are added using the CLP business rules.

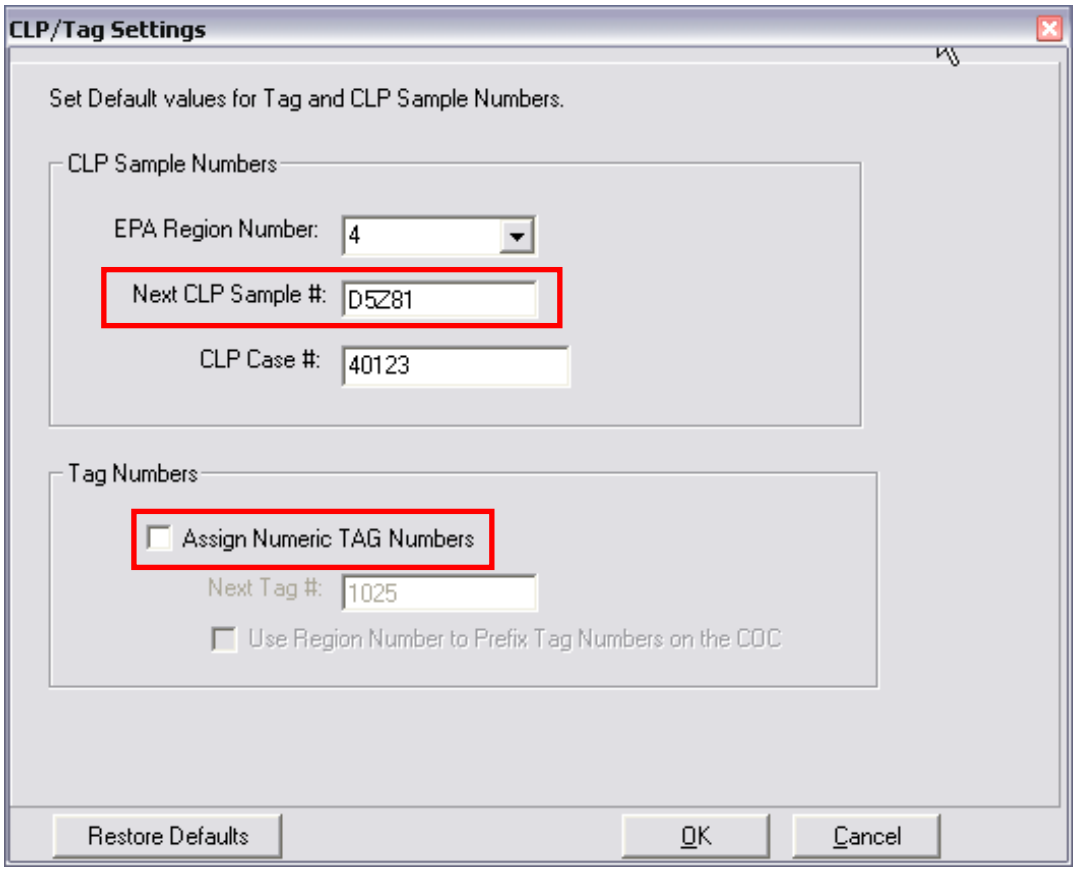
To modify the default settings:

1. Click on **File**.
2. Select **Options**.
3. Select **CLP/Tag Settings**.



4. The window for CLP/Tag Settings is displayed.

5. Input the appropriate information and click the '**OK**' button to Save and Close.



Adding CLP Samples and Assigning Analyses

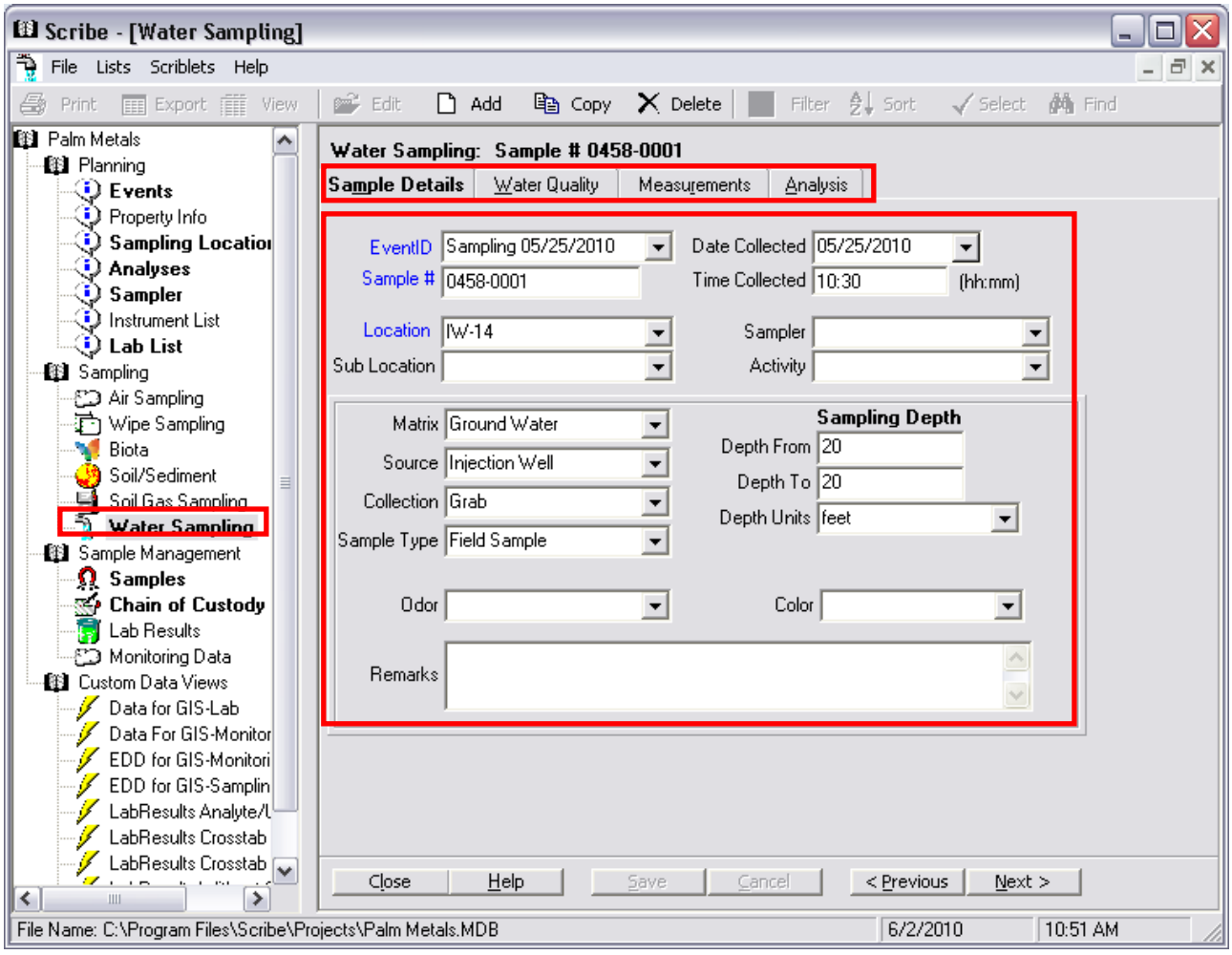
Depending on the type of sampling, click on the appropriate sampling task under Sampling in the left Navigation Pane. For example,

1. Click on '**Water Sampling'** in the left Navigation bar.

2. To add a Water Sample, click the '**Add**' button on the top menu.

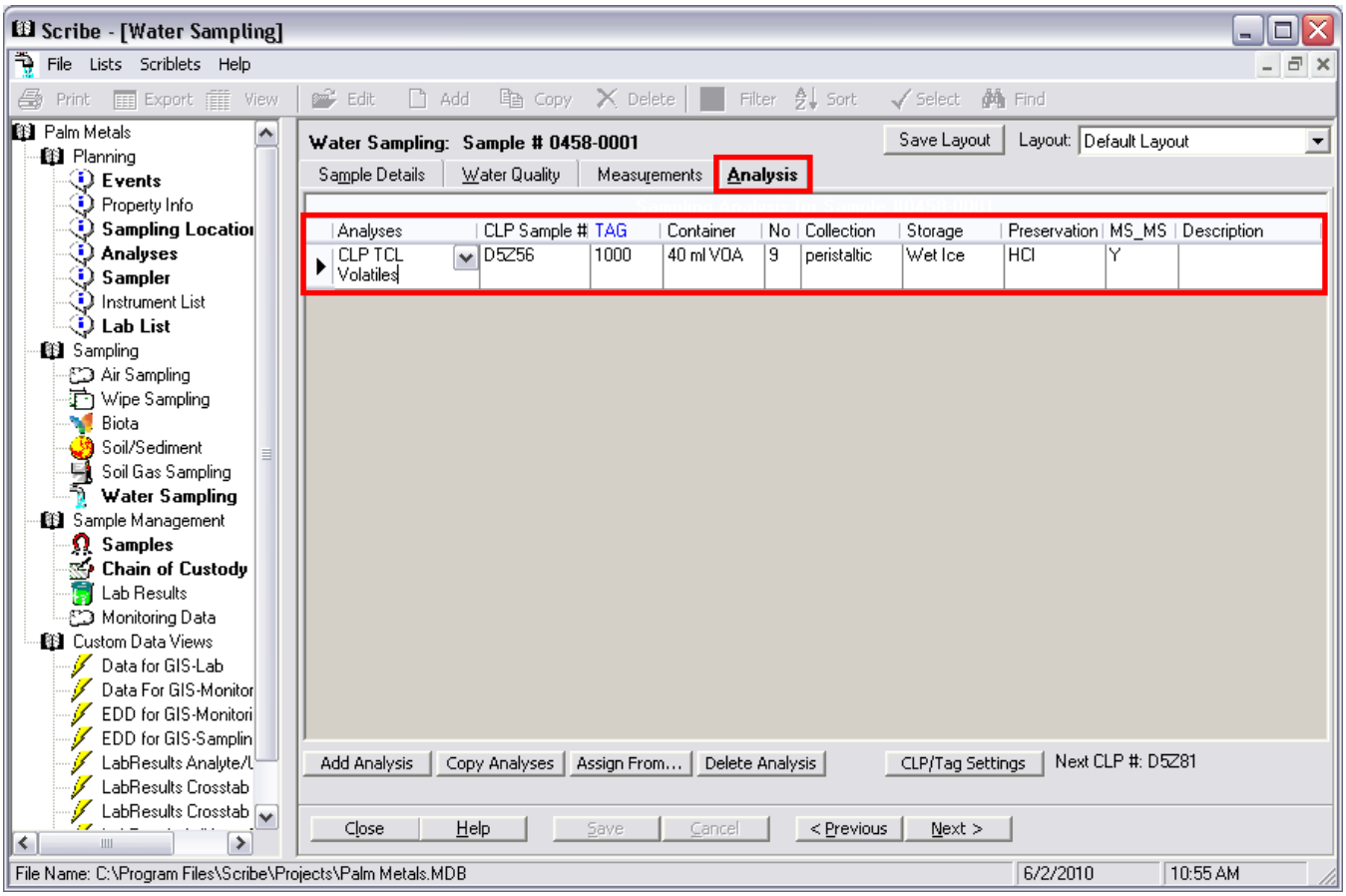
3. Enter sample information into the "**Sample Details"** screen.

Note: There are additional detail screens on the Water Quality and Measurements tabs. These tabs vary by sampling task. The details on the **Analysis** tab must be completed to assign an analysis to your sample.



Enter Analysis information for the Sample and assign CLP Sample and Tag numbers.

4. Click on the **Analysis** tab.
5. Click in the **Analyses field**.
6. Click on the **down arrow** for a list of the CLP Analyses that we referred to earlier.
7. Select an Analysis.



8. For a CLP Analysis, a Tag number and a CLP Sample number is assigned based on the CLP/Tag Settings.
9. To assign additional Analyses to sample containers, click the '**Add Analysis'** button.
10. When all analyses have been added, click the '**Close**' button on the bottom of the window to save and close.

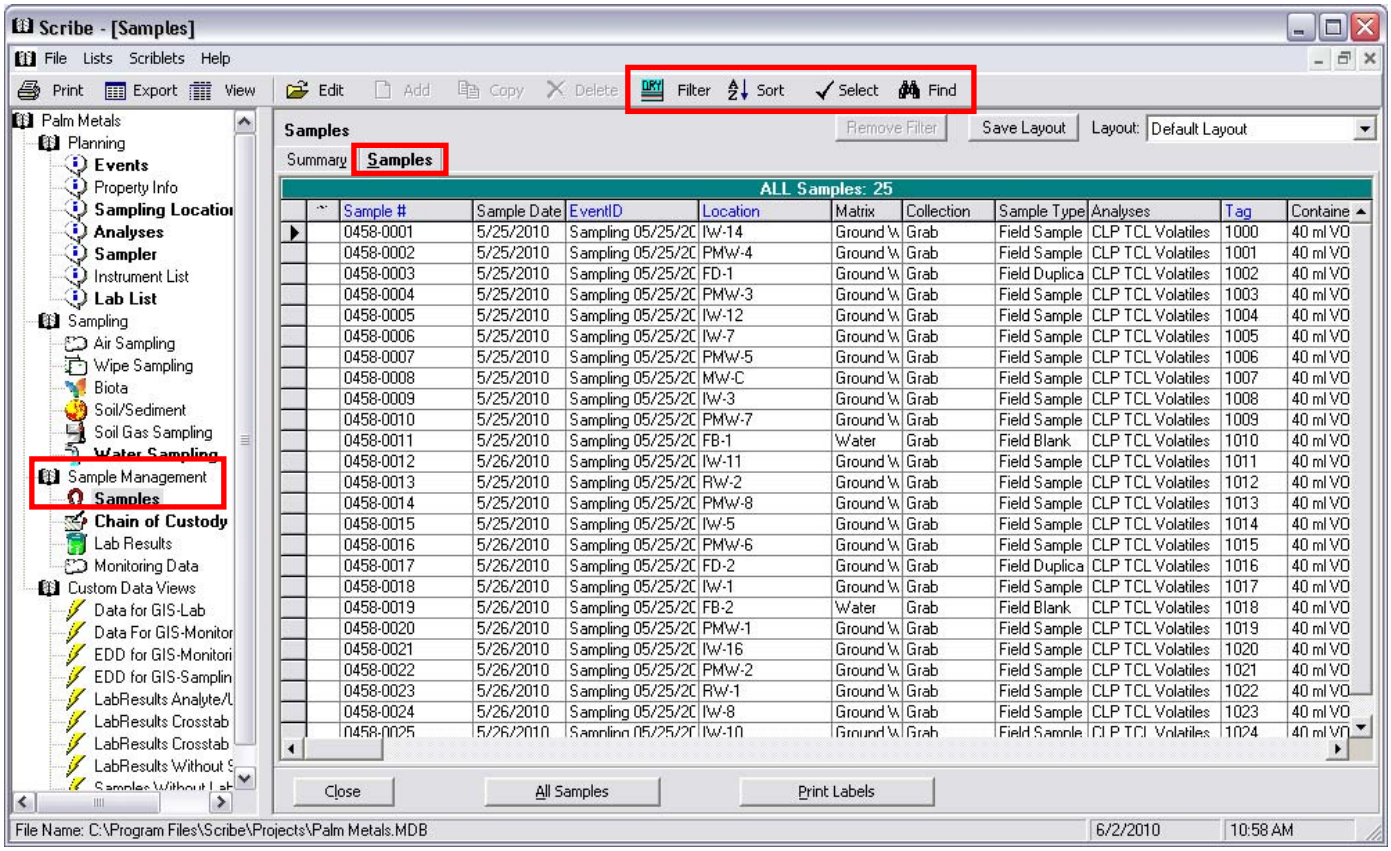
View Samples

Sample Management

Under Sample Management in the left Navigation Pane, you can view and manage all samples using Find, Filter and Sort. The options to Print labels and Chains of Custody are also available.

To view samples:

1. Click on '**Samples**' under Sample Management in the left Navigation Pane.

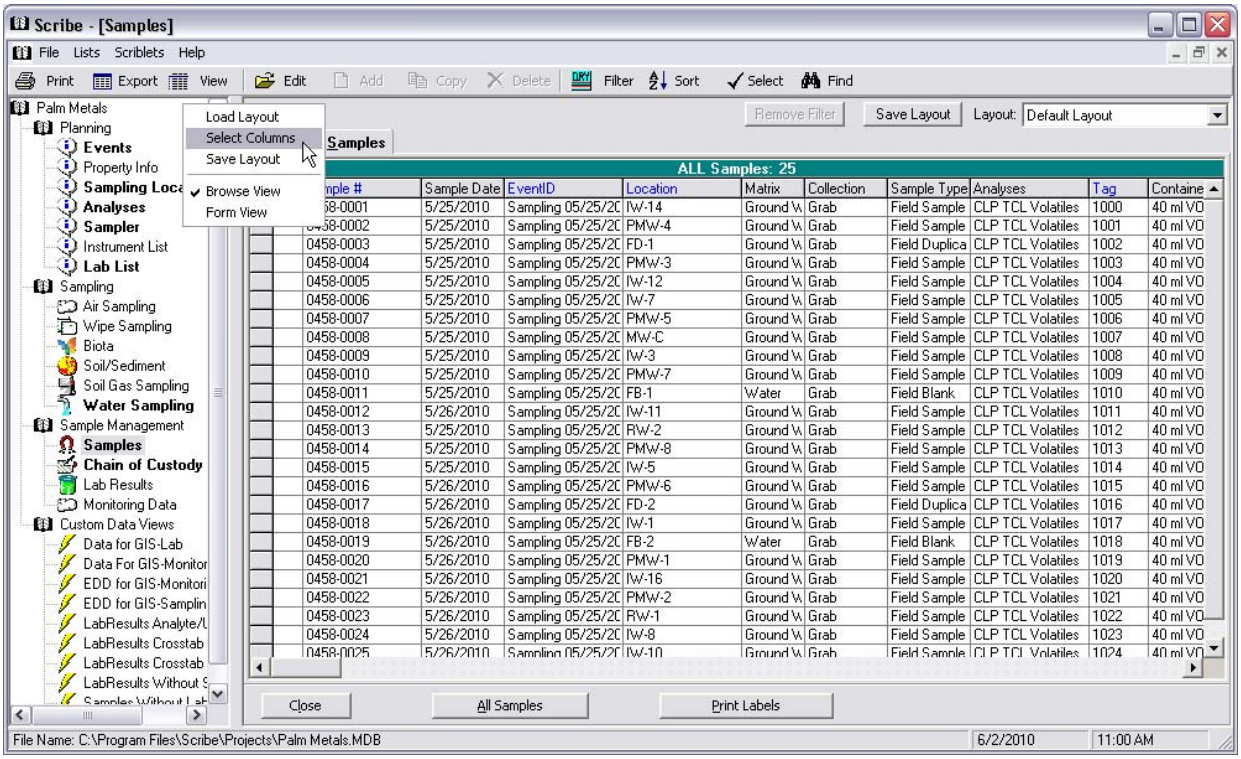


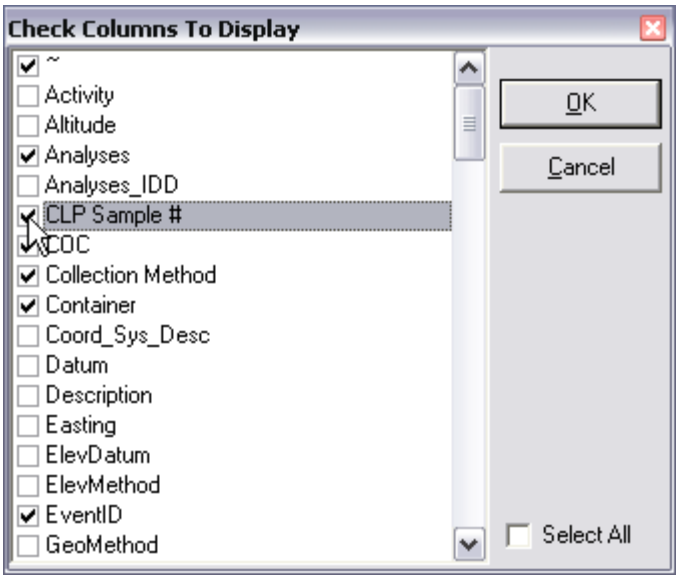
2. To filter your view of samples, RT-click on the field to filter on and select the '**Filter for…**' option. For multi-level filters, click the '**Filter**' button on the top menu bar.

3. To sort your view of samples, RT-click on the column heading and select a sort option. For advanced sort options, click on the '**Sort**' button on the top menu bar.

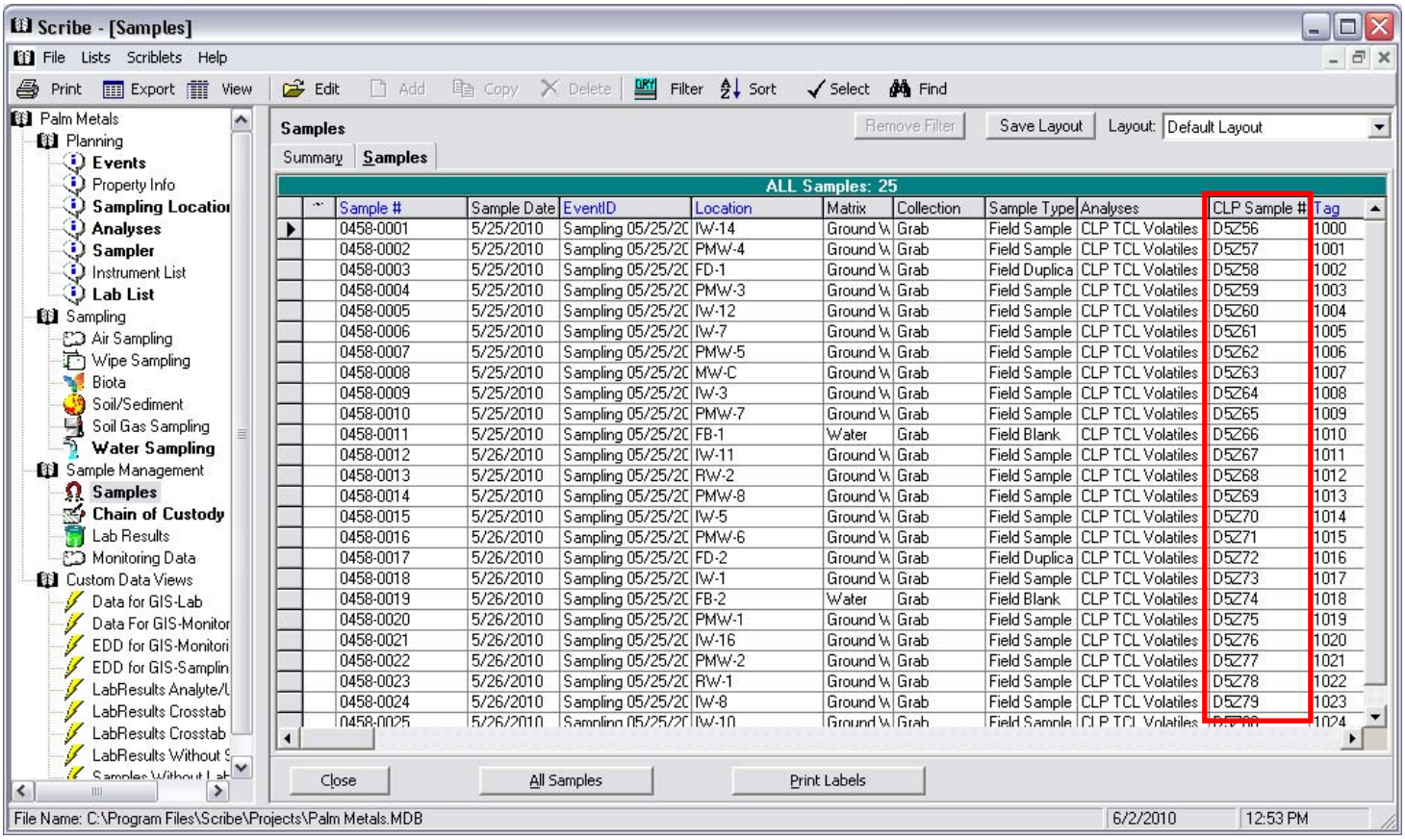
4. To find a particular sample(s), RT-click on the field and select the appropriate option. For multi-level finds, click the '**Find'** button on the top menu bar.

5. To see CLP Sample information including the **CLP Sample #,** click the drop-down menu for the Layout field on the top right corner of the window and select the '**CLP Layout**'.





6. The **CLP Sample #** column is now exposed.



LABELS AND CHAIN OF CUSTODY

CLP Sample Labels

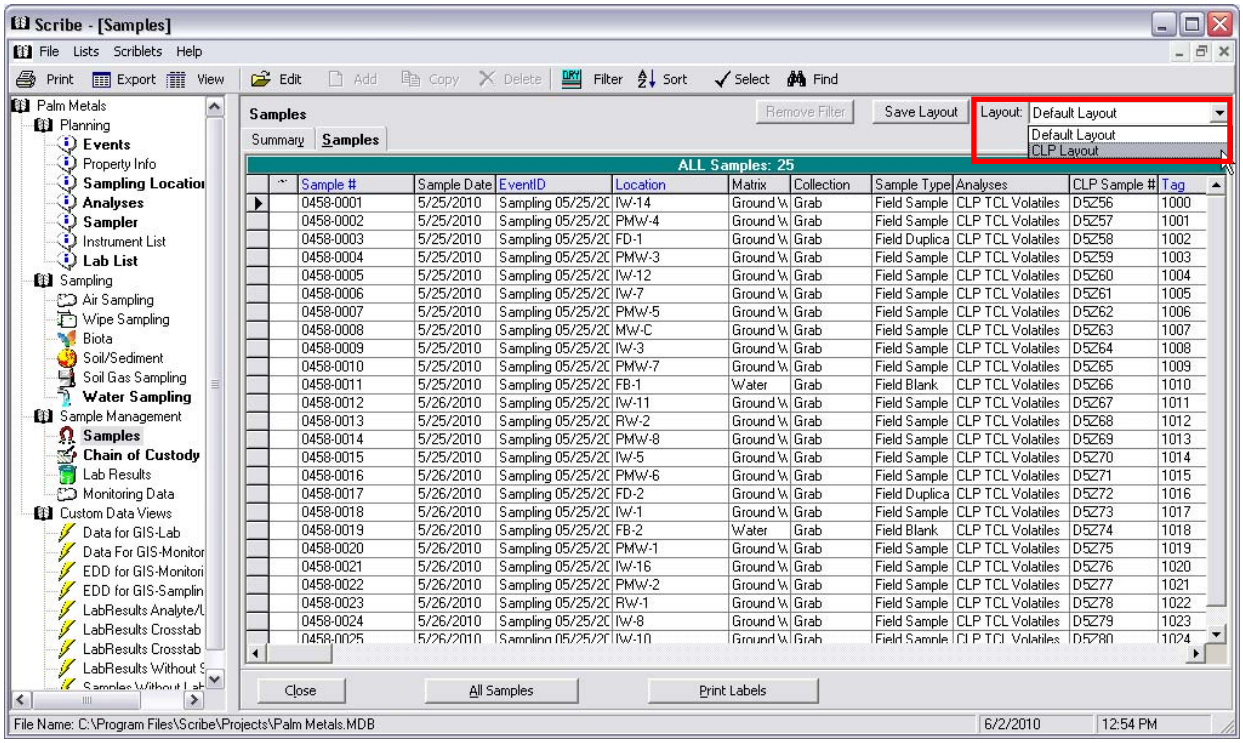
Print Sample Labels

Label options are available through the Samples View. Click on '**Samples**' under Sample Management in the left Navigation Pane. All samples shown on the screen are available to be printed on labels. You can apply Filters, Finds and Sorts to limit the display to the Samples you wish to see.

To configure your labels and print:

1. Click on **drop-down menu** for the Layout field on the top right corner.

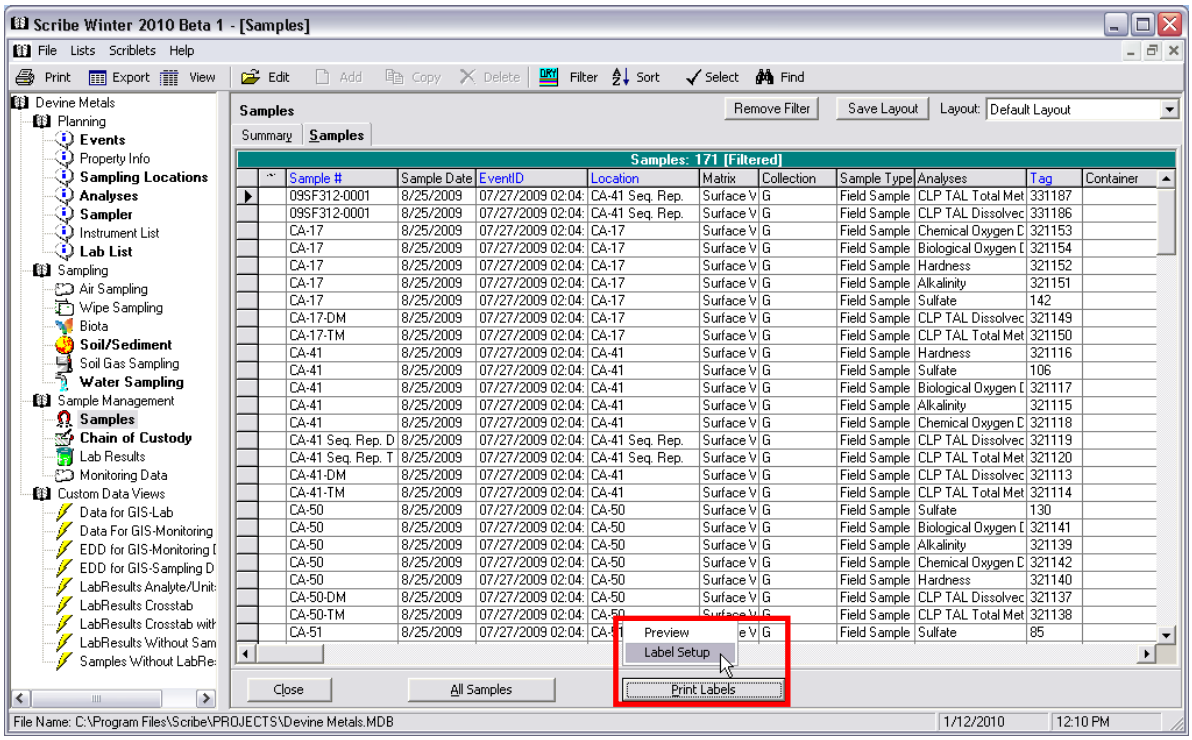
2. Select '**CLP Layout'**. This layout will replace the default Scribe Sample # with the CLP Sample # on the default label layout.

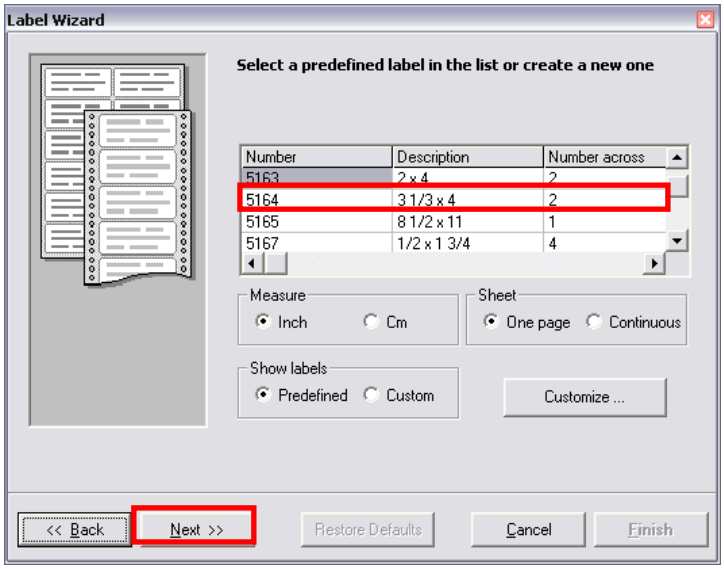


3. Click the '**Print Labels'** button on the bottom of the window.

4. Select '**Label Setup'** if it's the first time you are setting up a label.

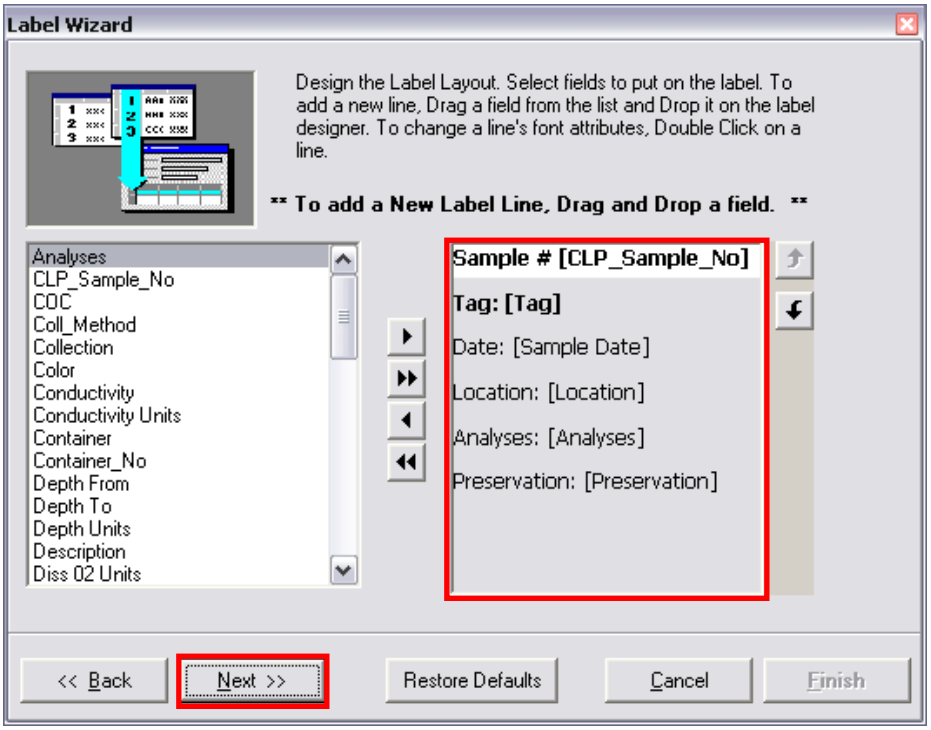
5. Select a pre-defined label format that matches your labels.





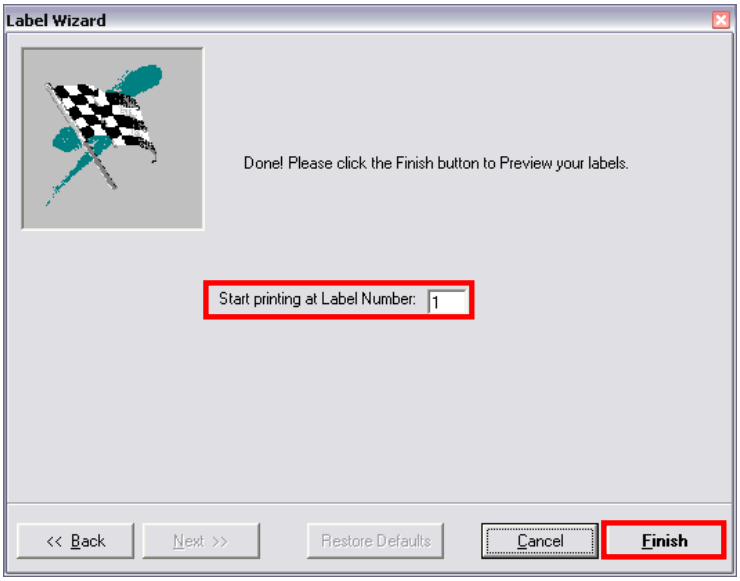
6. Click '**Next**' to continue.

7. Design your label by adding/removing fields to or use the default design. **Note:** The CLP Sample number instead of the Scribe Sample number will be printed on the label.

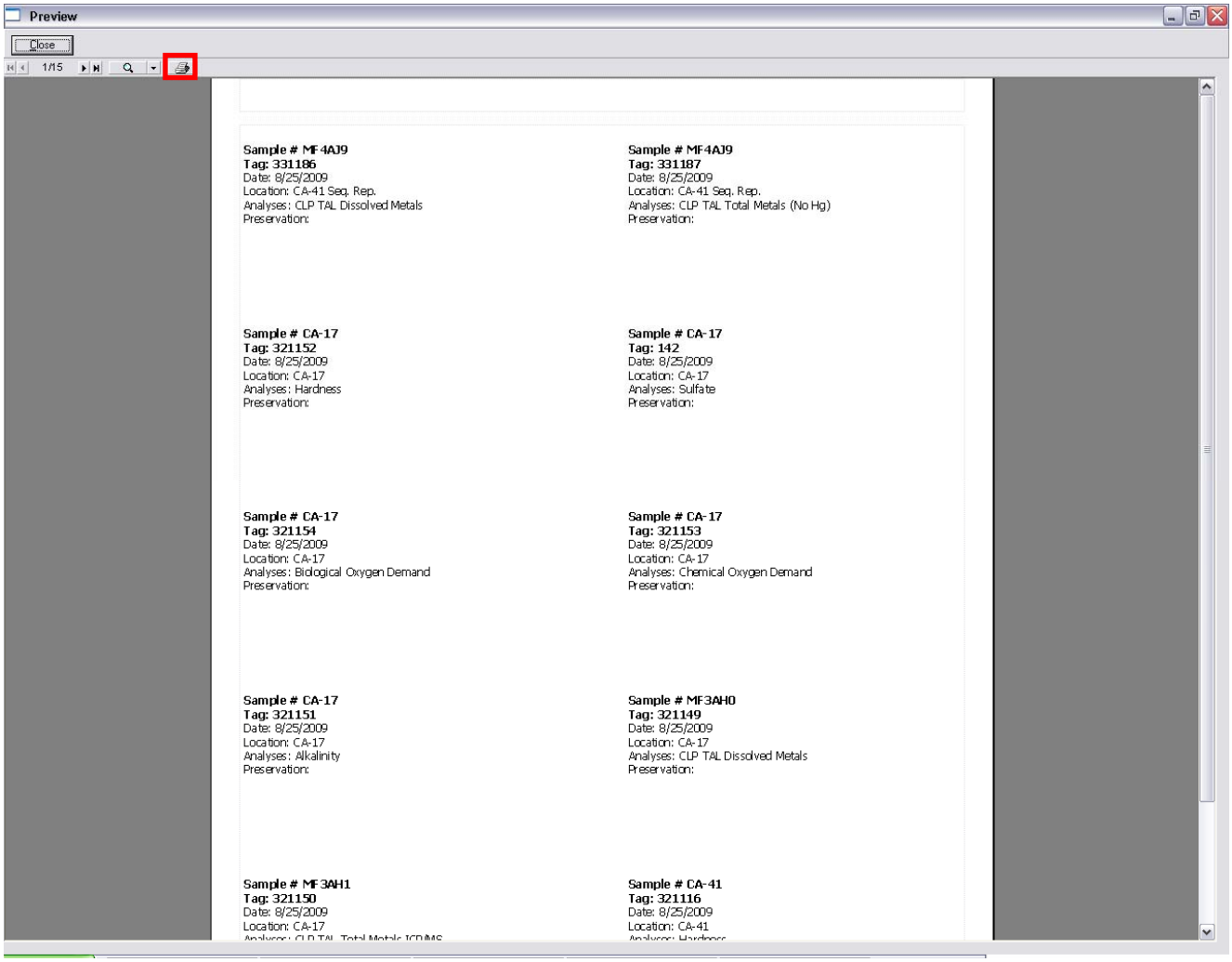


8. Click '**Next**' to continue.

9. If you need to print on half a sheet of labels, use this option to select which label to print on first. Otherwise, click '**Finish**' to continue.



10. A preview of the labels to be printed is displayed.



11. Click on the Printer icon on the top menu bar to print the labels.

Chain of Custody

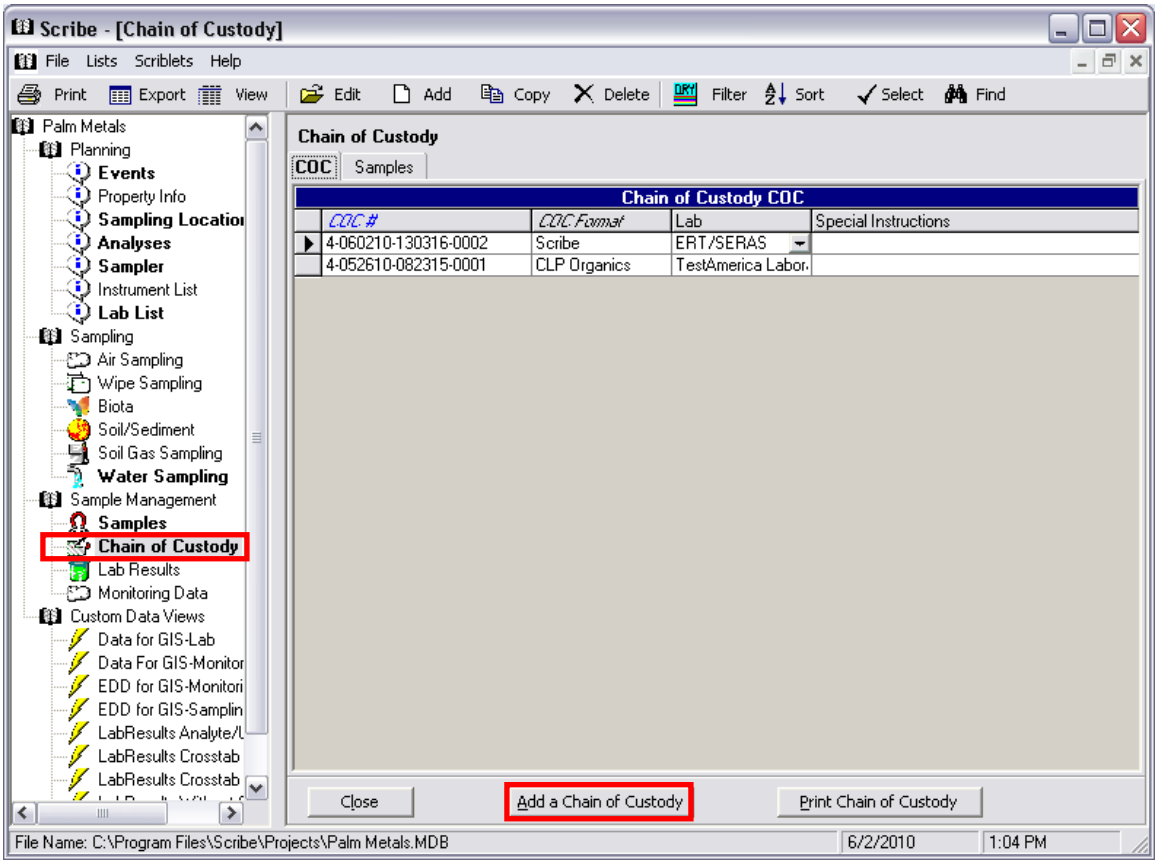
A new feature in Scribe to support CLP sampling is the COC Format for the Chain of Custody. The COC Format option modifies the COC form to adhere to COC standards and requirements. It also controls what samples can be assigned to the COC. For example, Samples with Inorganics analyses can only be assigned to the CLP Inorganics format on the COC.

Note: After submitting samples to the CLP labs, it is recommended that users request the labs to return lab results in electronic format i.e. a spreadsheet (.xls) or a comma-separated text (.csv). Scribe has a Custom Import feature that will import lab result data and marry them up with the sampling data. This effectively eliminates transcription errors and reduces data processing time. See the "Scribe Manual Advanced Part III" for importing details.

Create COC and Assign Samples

To manage and print a Chain of Custody (COC), a COC needs to be created and then samples have to be assigned to the COC:

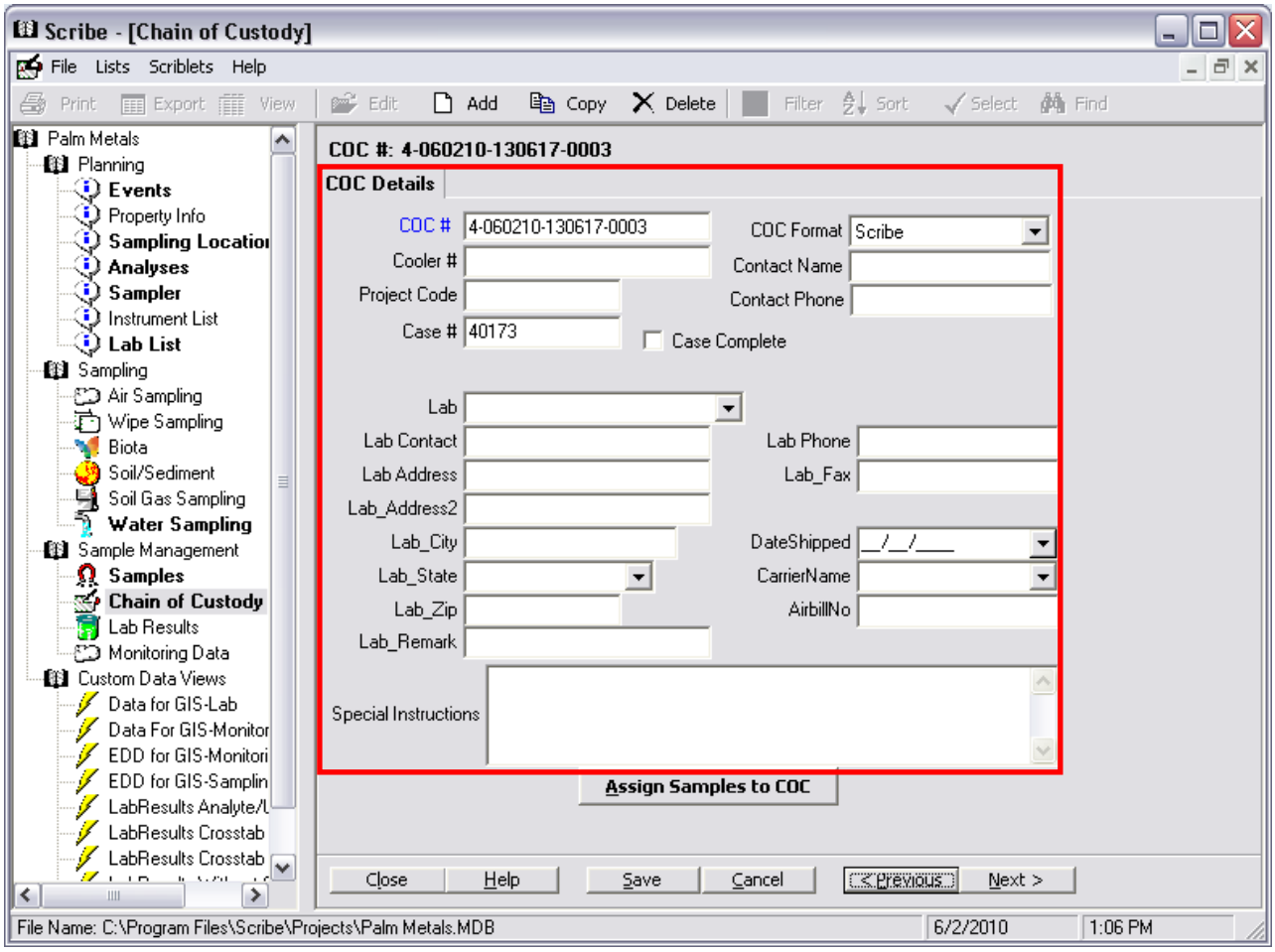
1. Select '**Chain of Custody**' under Sample Management in the left Navigation Pane.



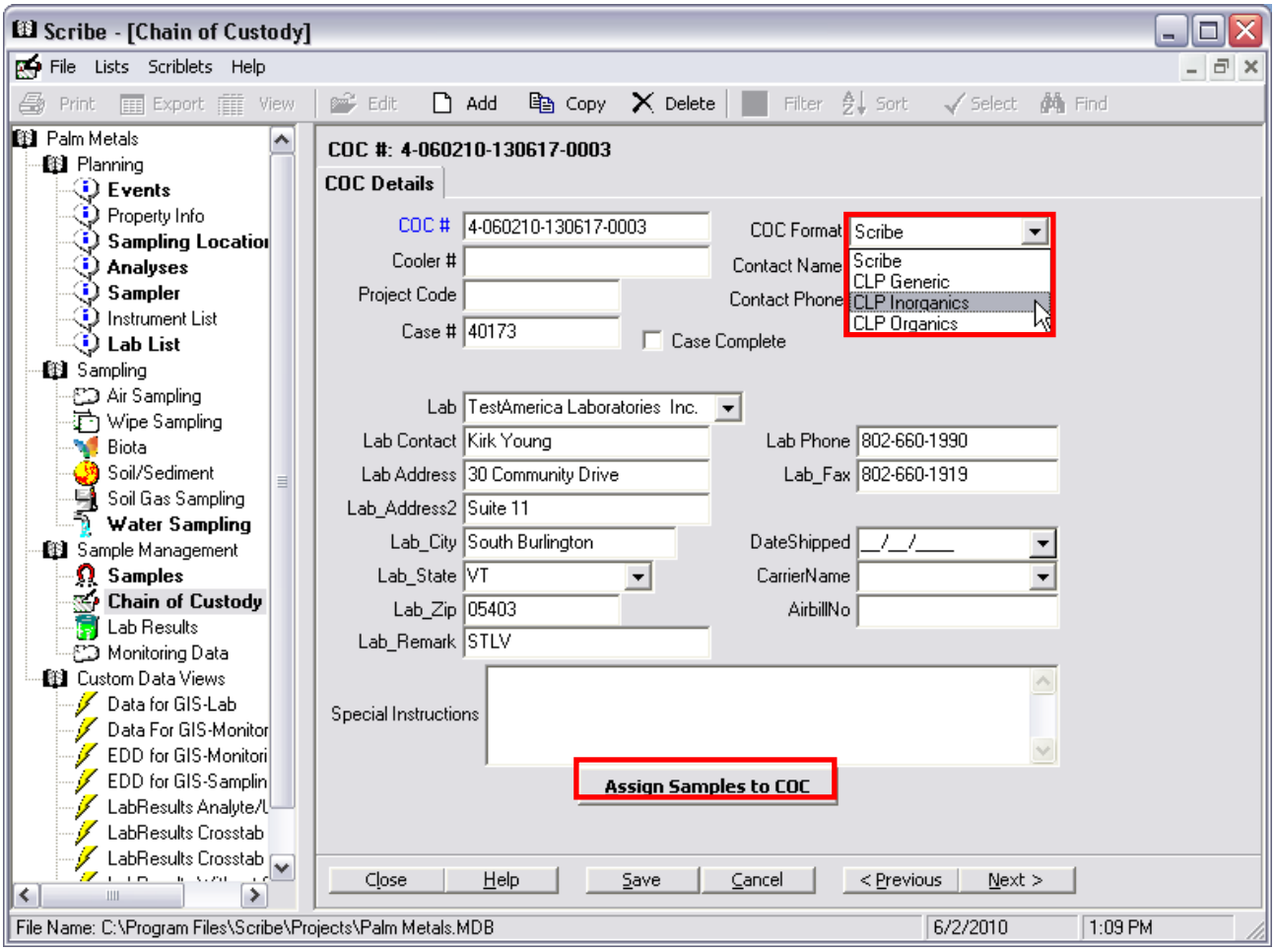
2. Click the '**Add a Chain of Custody**' button on the bottom of the window.

3. The "**COC Details**" screen is displayed.

4. Complete the form by entering other fields such as the **Case #, Cooler #, Lab, and Lab Phone**.

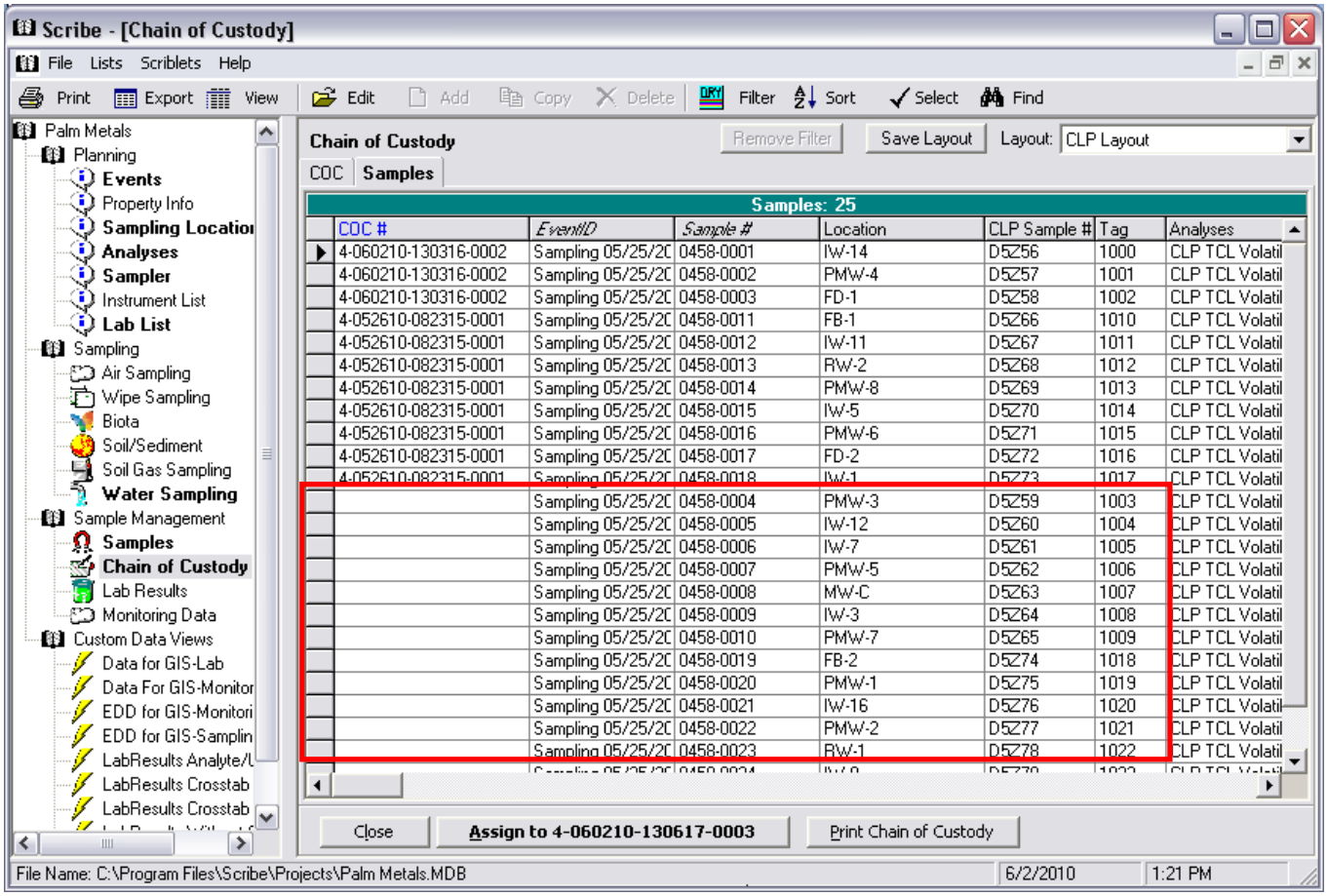


5. Select the appropriate **COC Format** based on the type of COC Samples you are packing. For example, if you are creating a COC for Inorganics, select COC Inorganics. The CLP Generic COC option should be used if you are submitting samples to a program other than CLP but one that requires a CLP/F2L type COC for generating CLP type XML files. Based on the format setting you select, the system will filter for only those types of samples that can be added to this COC.



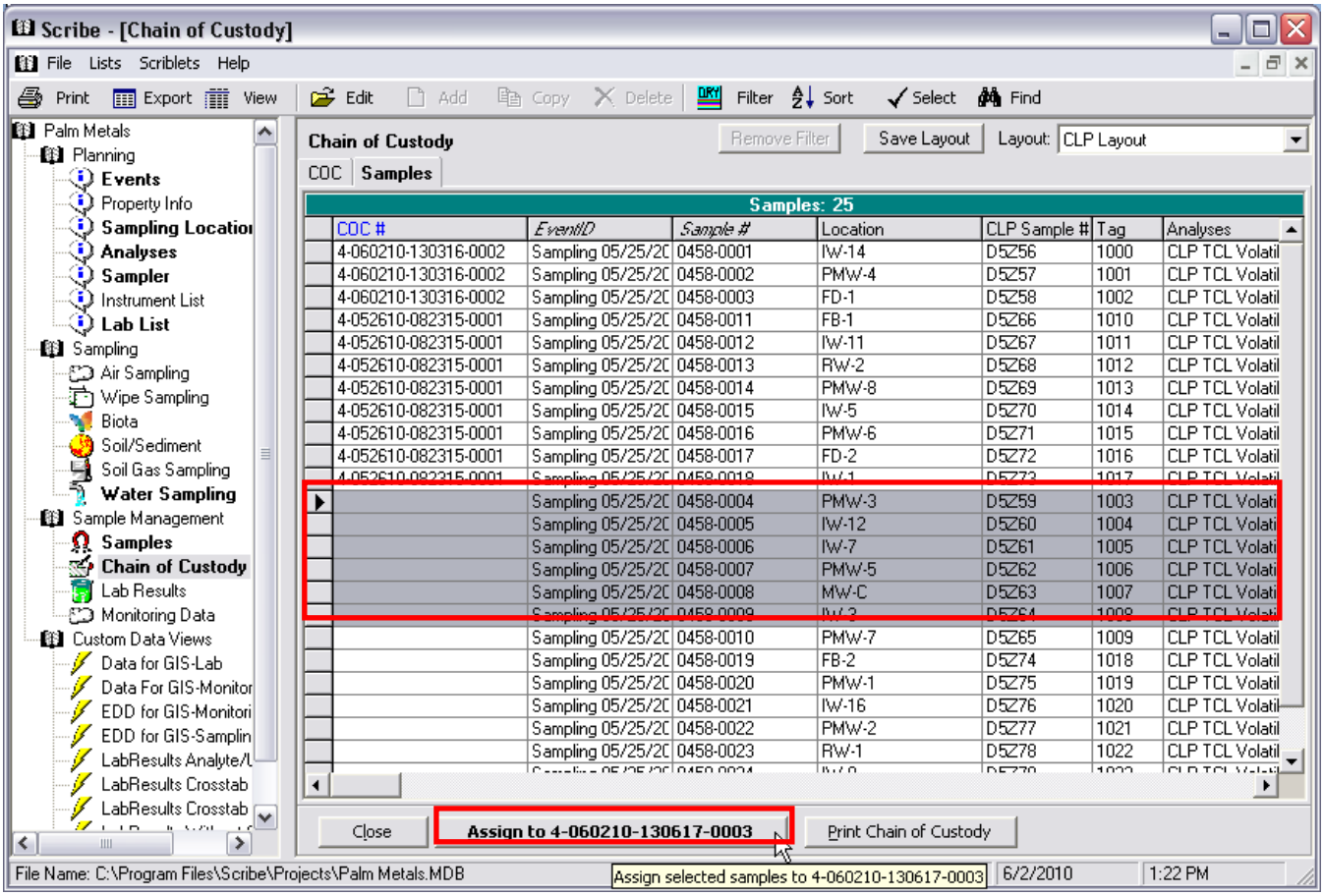
6. Click '**Assign Samples to the COC'** to continue.

7. The "**Chain of Custody Samples**" screen appears. Samples that have not been assigned to a chain are displayed at the bottom of the list.

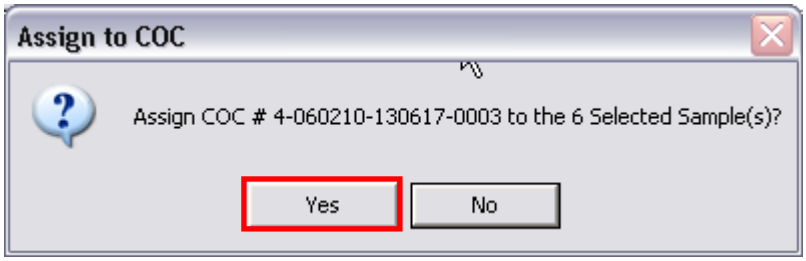


8. Highlight the samples to assign to the new Chain of Custody. Highlight multiple samples by holding down the Shift key or Ctrl key while clicking on the first column before COC# of the samples you wish to assign to the COC.

9. Click the '**Assign to...**' button on the bottom of the window to assign the samples to the Chain of Custody.



10. You will be prompted to confirm. Click '**Yes**' to assign the selected samples to the COC.

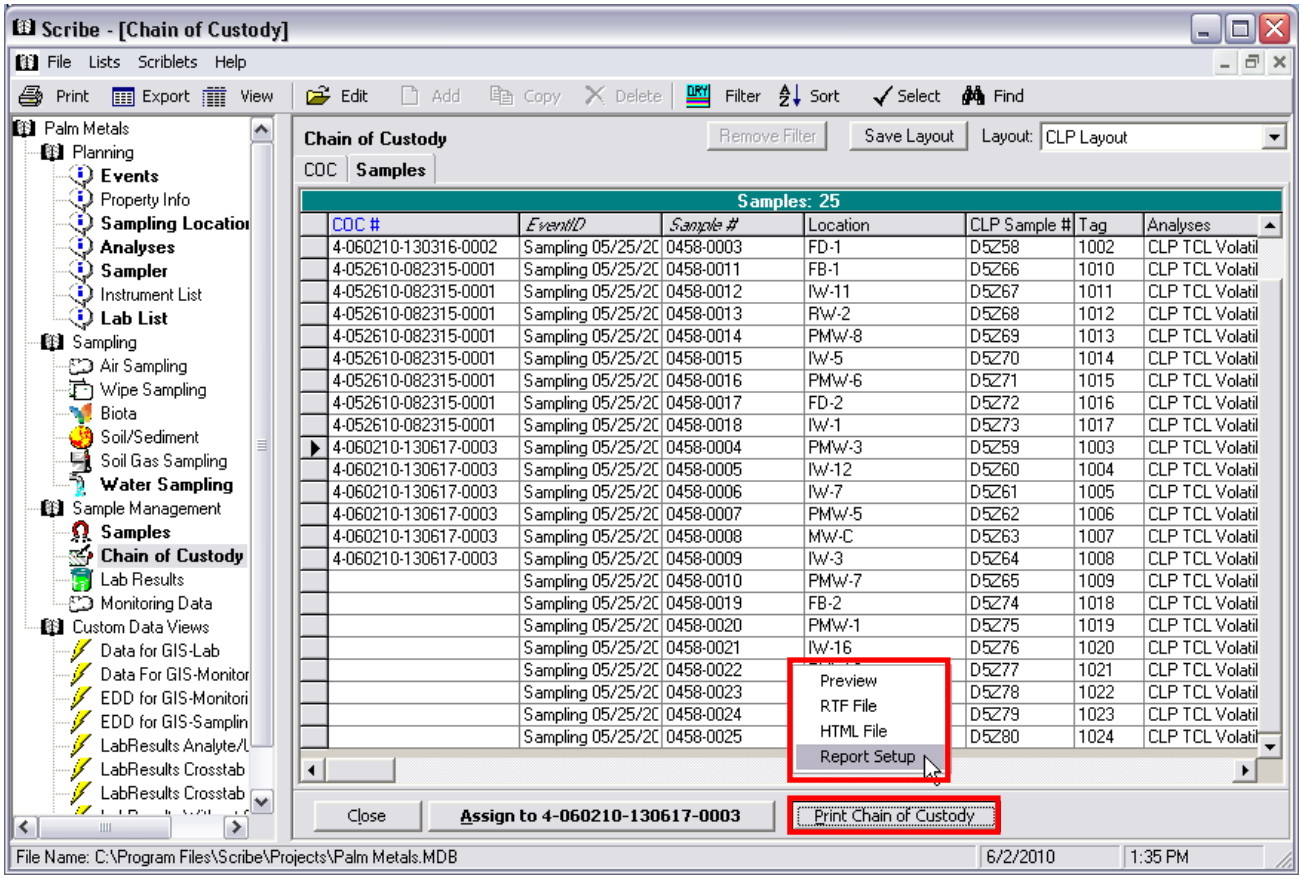


11. You are now ready to configure and print your COC.

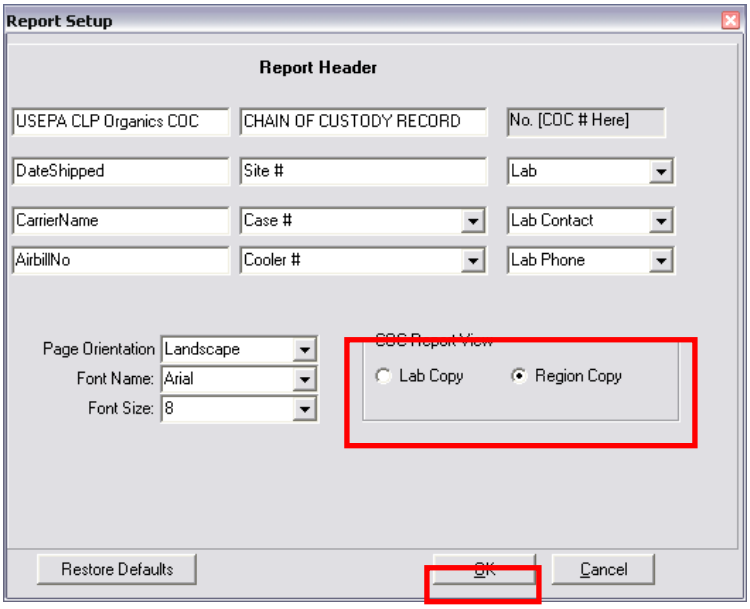
Configure and Print COC

To configure and print a COC:

1. Click the '**Print Chain of Custody**' button.
2. Then select '**Report Setup**'.

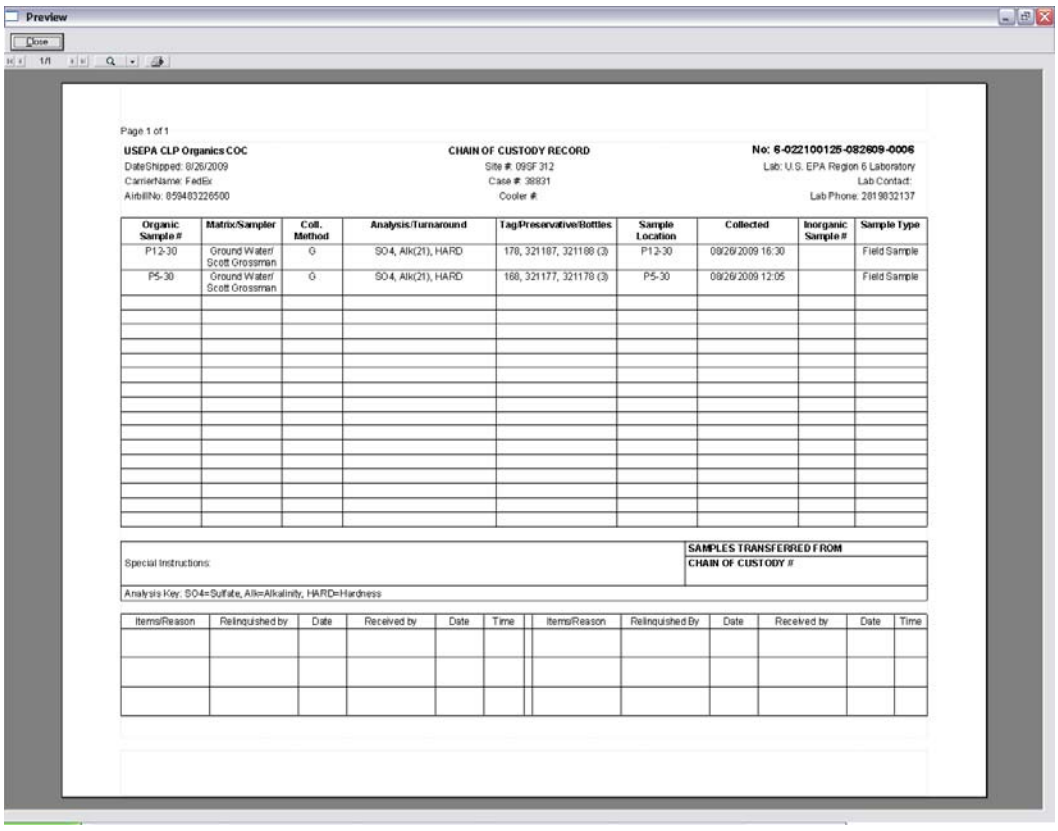


3. The Report Header settings are displayed.



4. The COC Report View (Lab or Region Copy) can also be selected.

5. Click '**OK**' to preview and print the Chain of Custody.

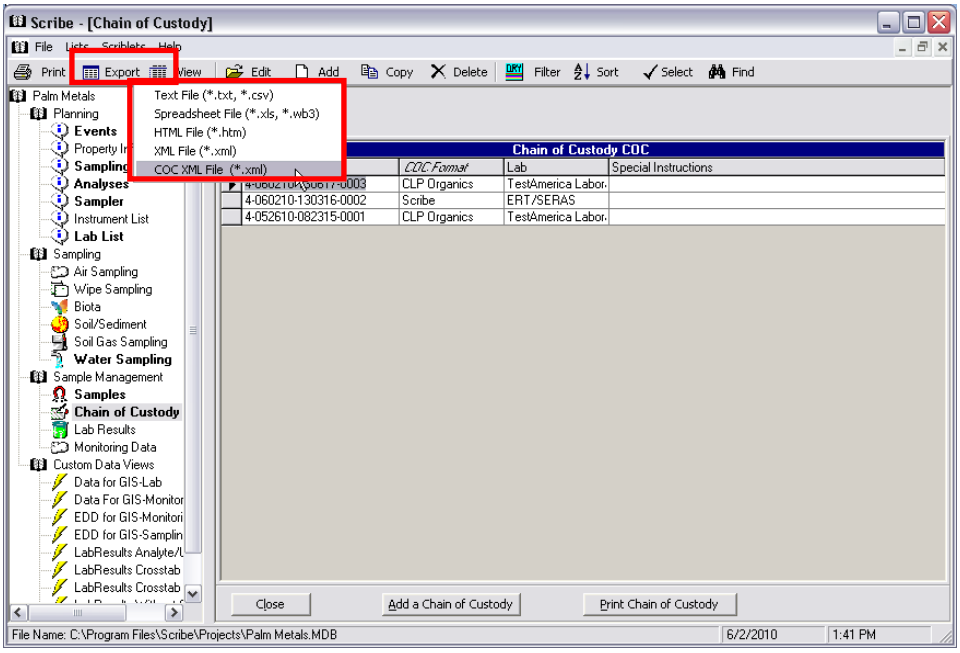


Export to XML File

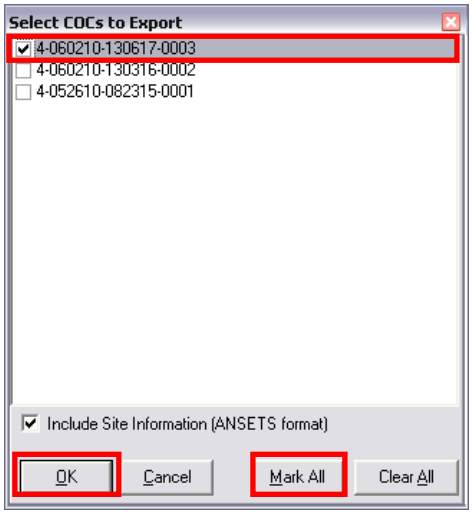
Export COC to XML

A new feature in Scribe is the ability to export the CLP COCs to an XML file. To export:

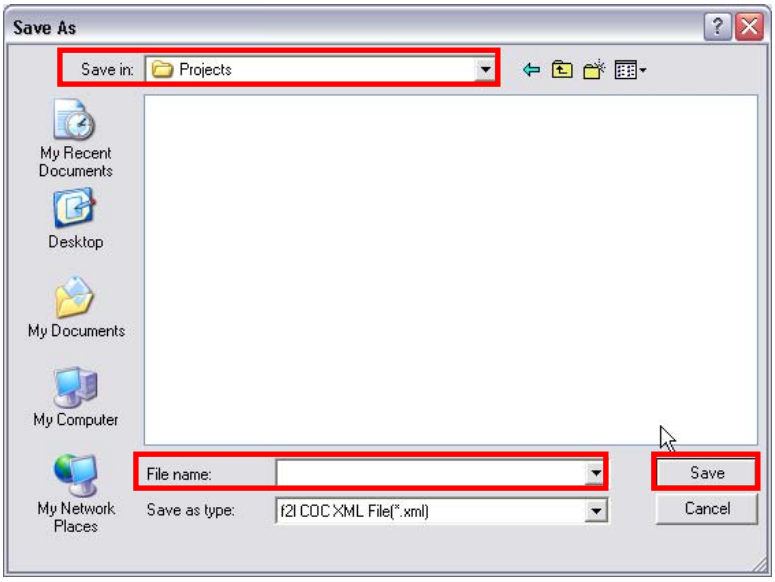
1. Click the '**Export'** button on the top menu bar.
2. Select '**COC XML File (*.xml)**' option.



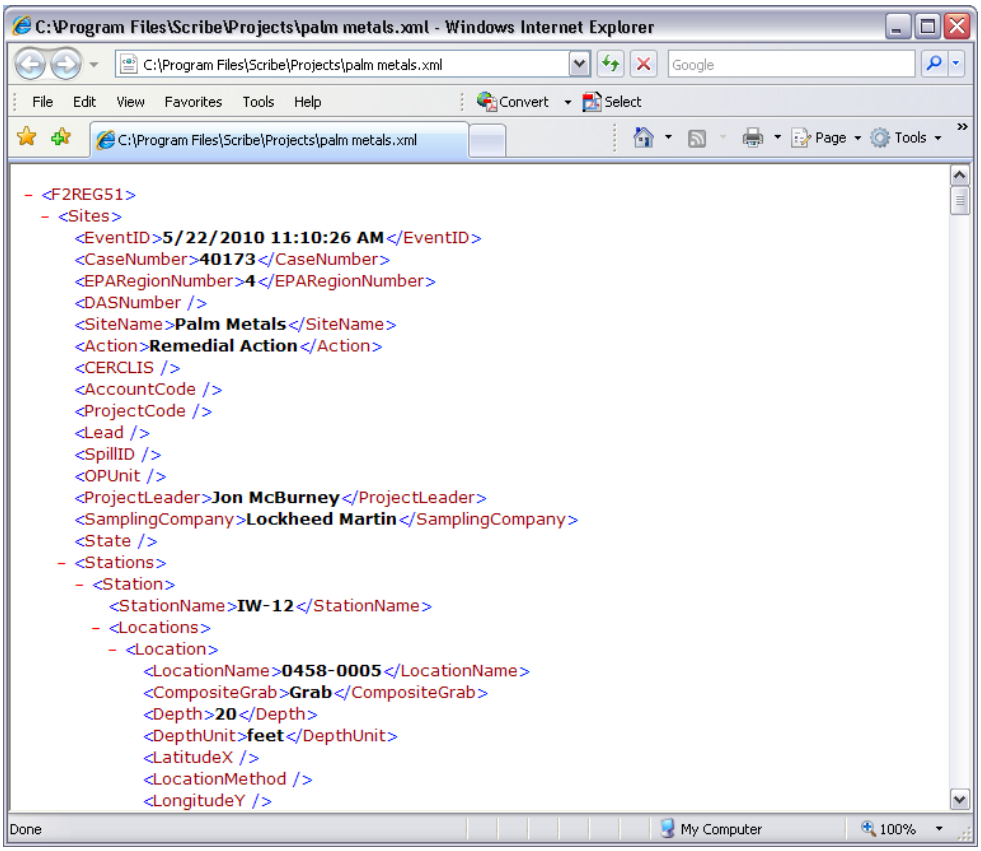
3. Select the Chain of Custody records to export by checking the individual records or click **'Mark All'** to select all COCs.



4. Select your location and provide a filename and click '**Save**'.



5. The XML file will open in Windows Internet Explorer while the file is created and saved.



REPORTING

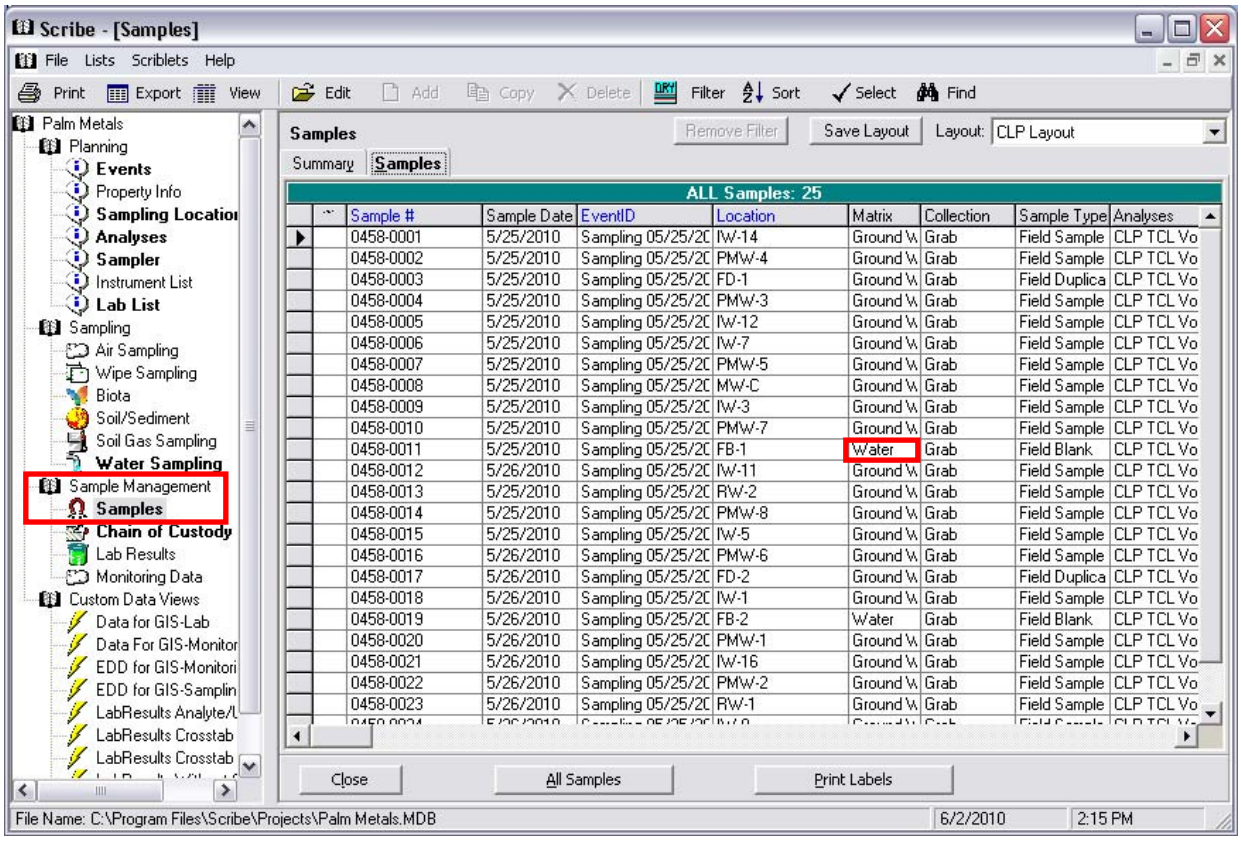
Scribe has flexible reporting options. The most popular way to report out from Scribe is to manipulate the grid view in the All Samples screen to display the data you wish to report. Then export the grid data to an file type that fits your reporting needs. File types include .txt, .csv, .xls, .htm, .xml, .kml, and .kmz.

Find, Filter and Sort

Scribe has built-in user-friendly querying functions such as Find, Filter and Sort. These functions are most useful when you are searching for a particular subset of data that meets one or more criteria.

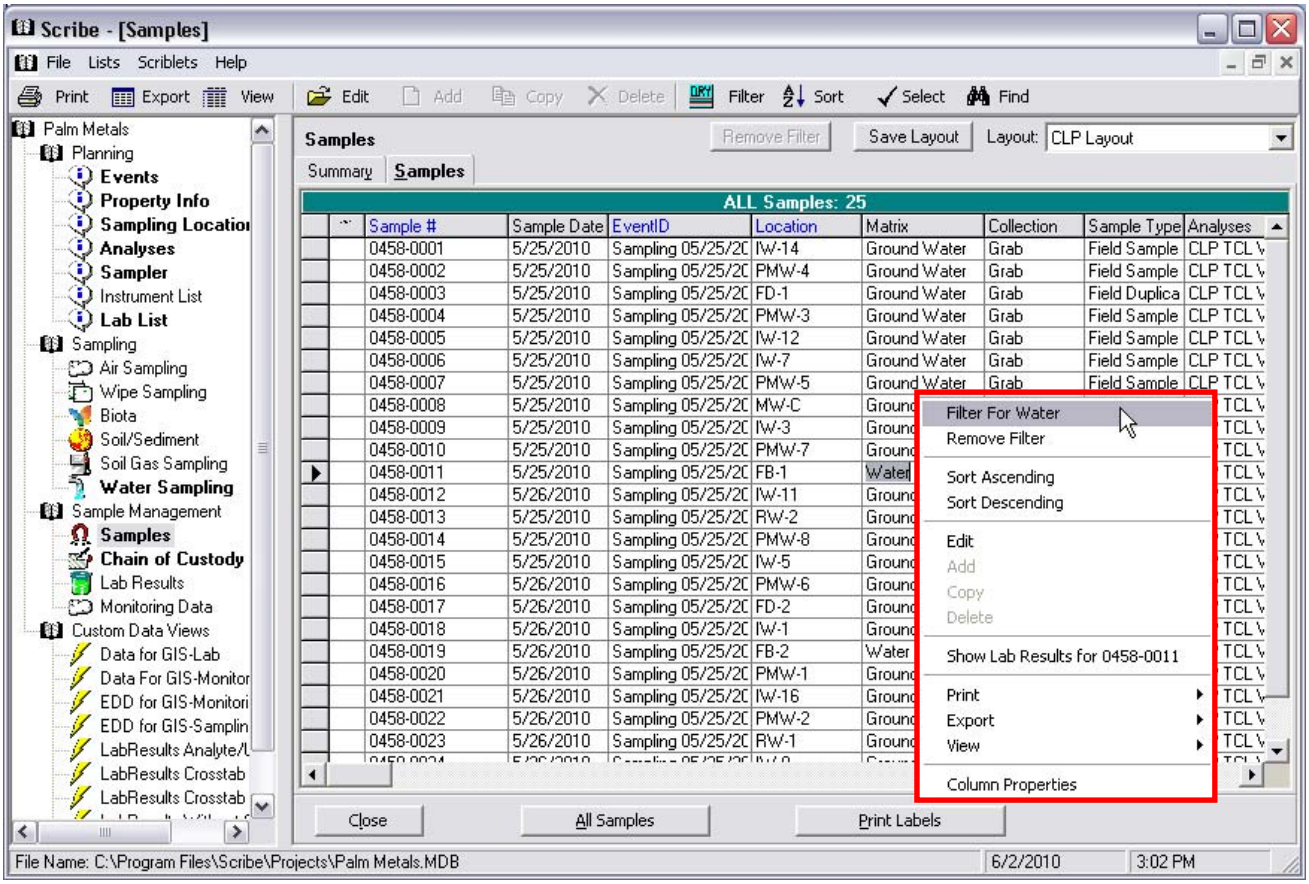
For example, to find and filter for all samples with a Water matrix or Sort ascending/descending:

1. Click on **'Samples'** under Sample Management in the left Navigation bar.



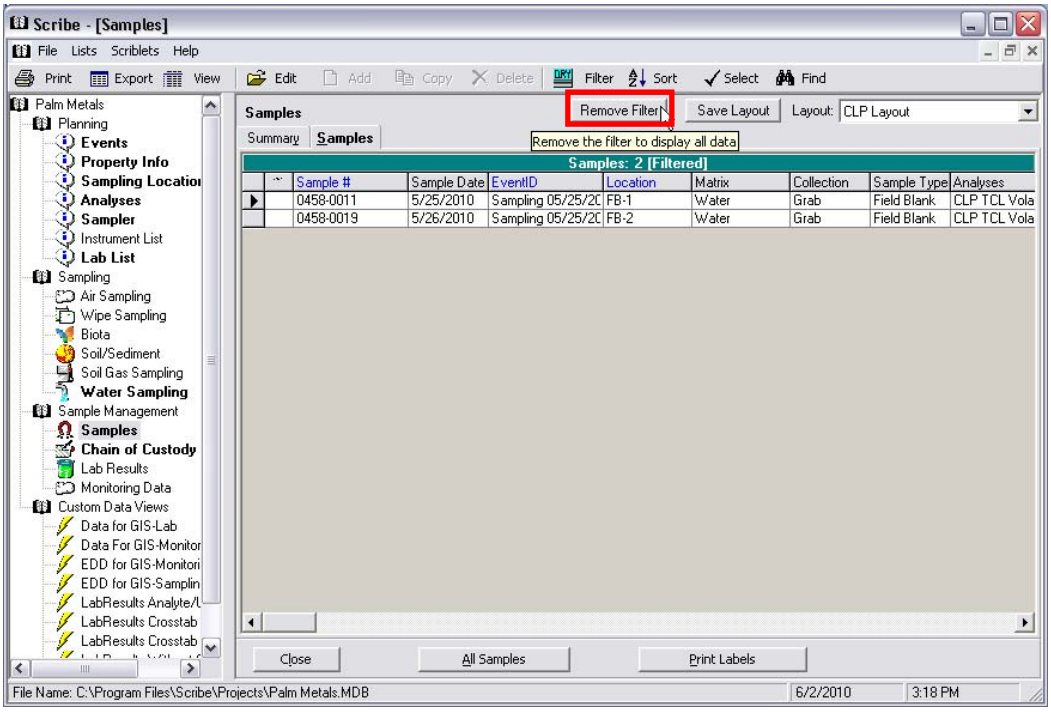
2. To filter or sort on ONE criteria, RT-click on Water value in the Matrix column.

3. Select '**Filter for Water'** in the pop-up menu or select Sort.

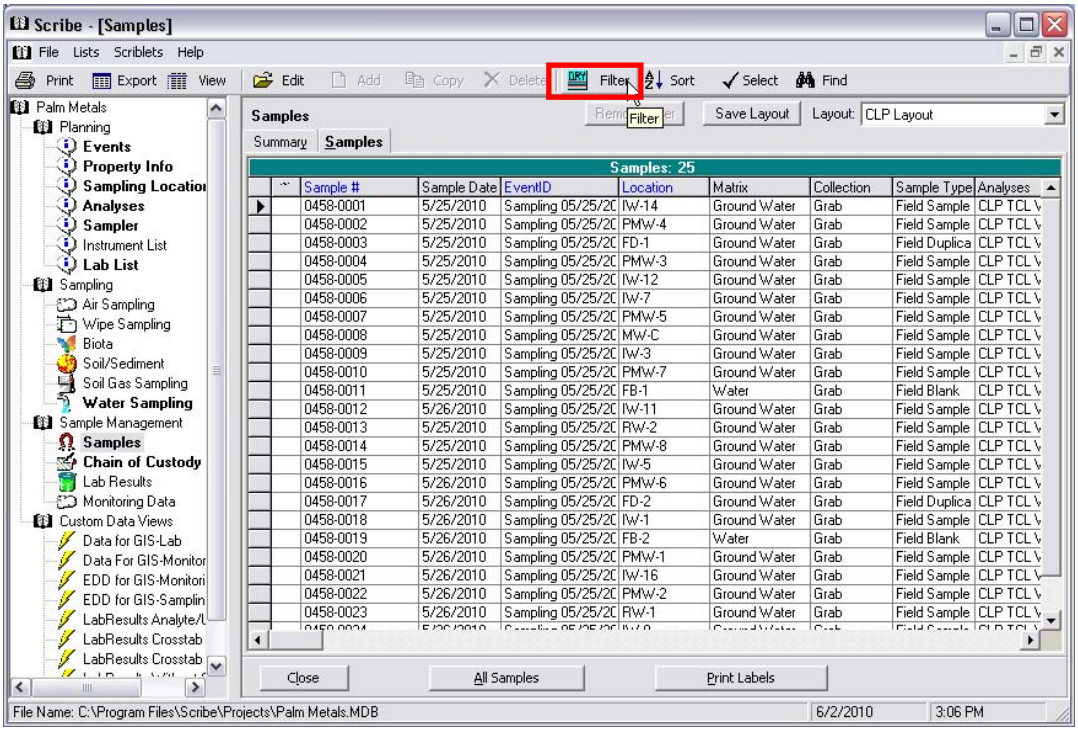


All records that have Water in the Matrix field are displayed.

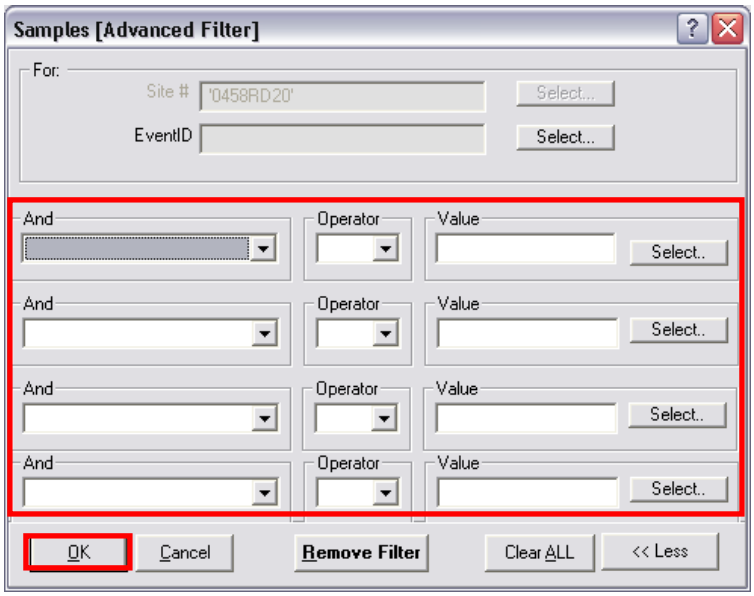
4. To remove the applied filter, click the **'Remove Filter'** button at the top of the screen.



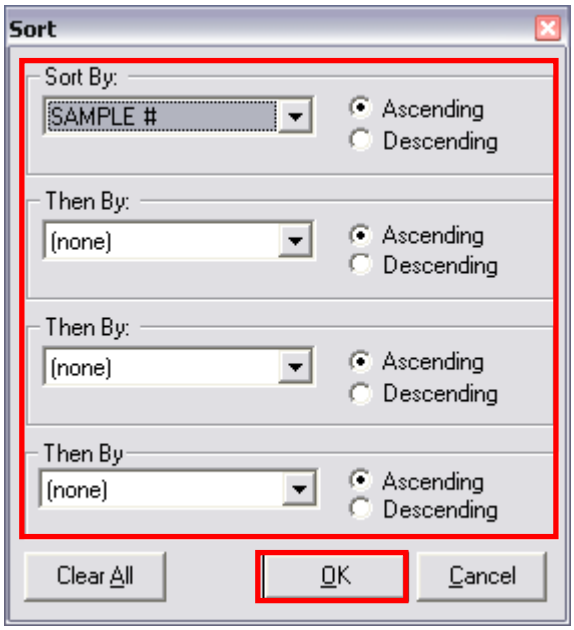
5. To filter on multiple criteria, select the **'Filter'** button on the top menu bar.



6. The Advanced Filter window is displayed. Input the criteria that for your search and click **'OK'** to apply the filter.



7. The Advanced **Sort** button also provides multi-tiered sorting options for sorting on more than one criteria.



Export

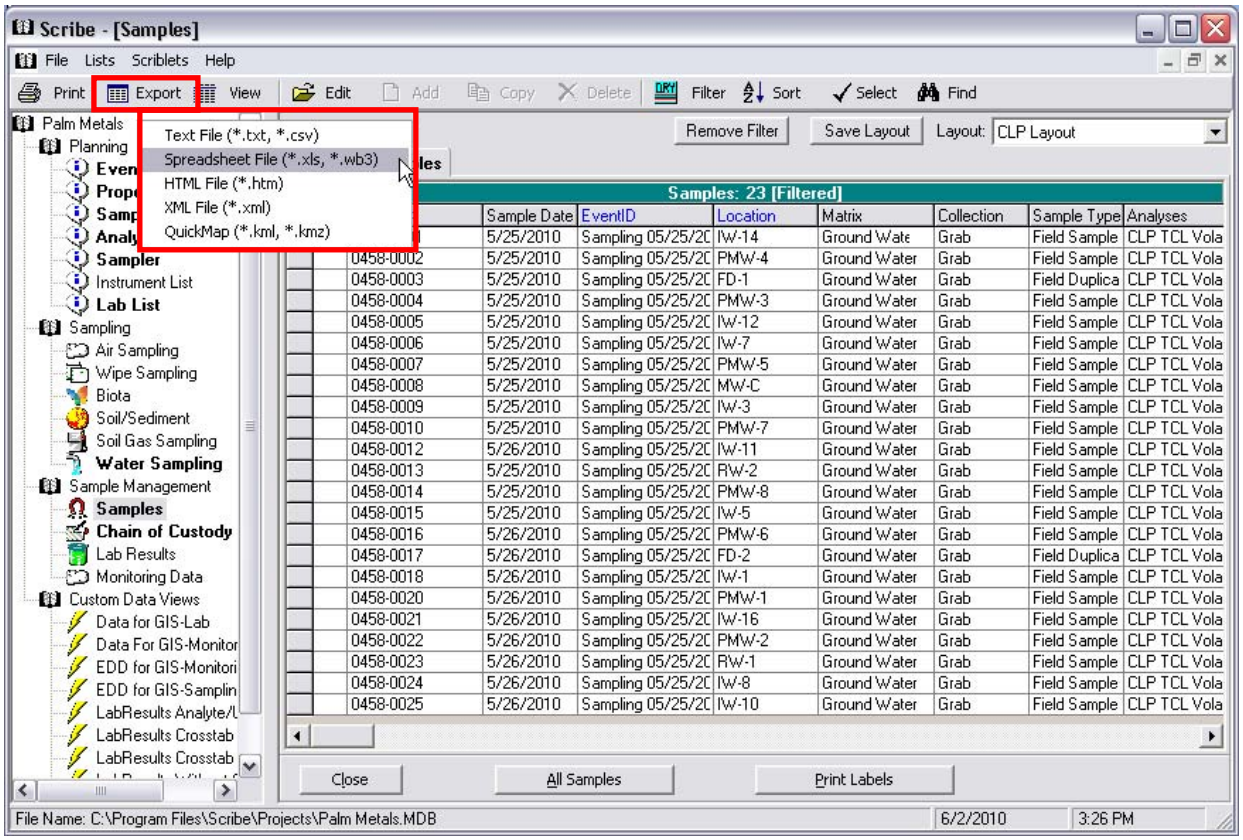
The Scribe grid view does not display every field in Scribe. Select fields are displayed by default and the user can turn on/off the columns. Turn on/off columns as described in the Sample Management section of this document to manipulate the data that is displayed.

After your grid view contains the data necessary for reporting purposes, the user can export the grid view to a third-party file type.

To export the grid view:

1. Click on **'Export'** button on the top menu bar.

2. Select the file type to which you wish to save the data. For example, Spreadsheet (.xls).



3. You will be prompted to select the destination and name the file.

4. The file will open in the external application if it is installed on your computer. For example, if you selected Spreadsheet, Excel will open with the grid data.

Worksheet Reports

Scribe provides a generic worksheet report that allows the user to customize the Header of the report to suit their needs. This option can be used to customize a Samples Report that could be used as a Receipt for Samples on residential sampling tasks.

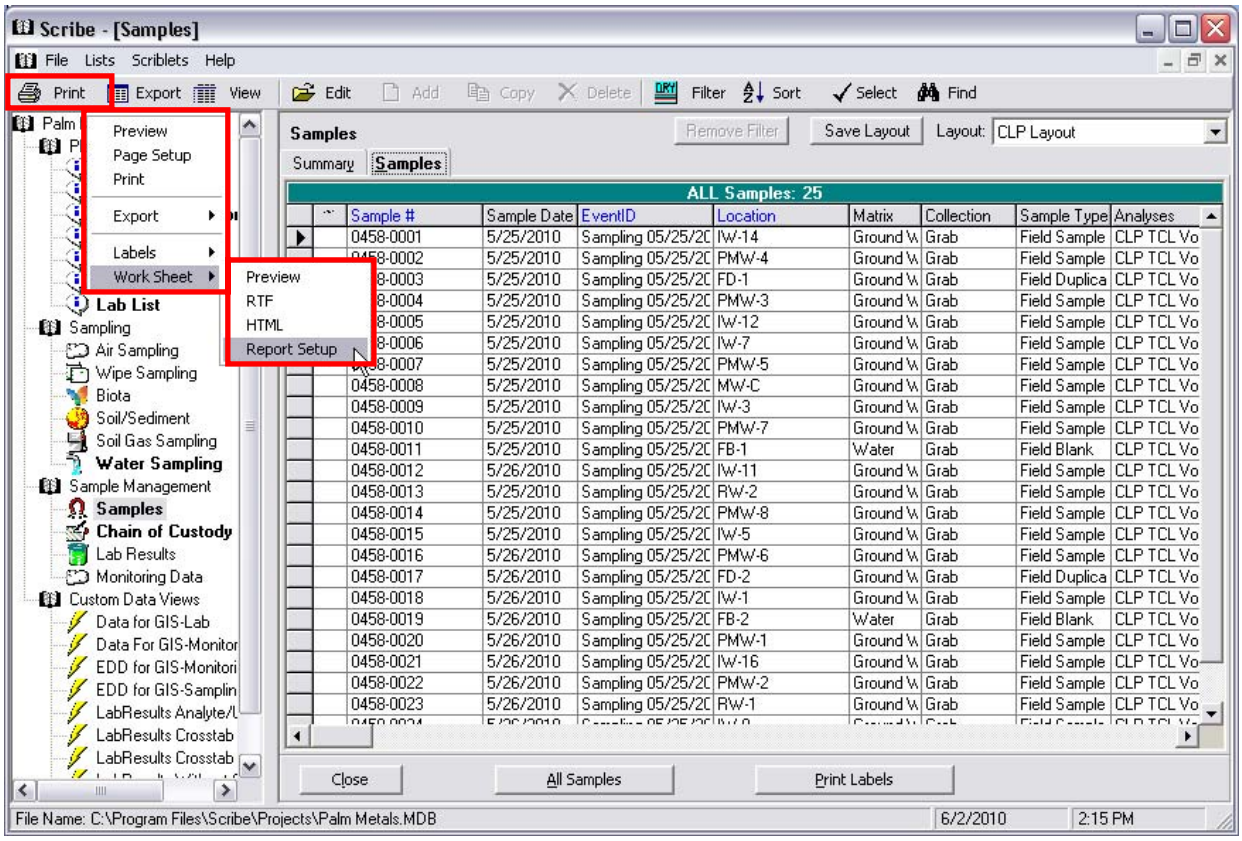
To generate the worksheet report:

1. Use the Find, Filter and Sort options and Column Views to display the data you want to report.

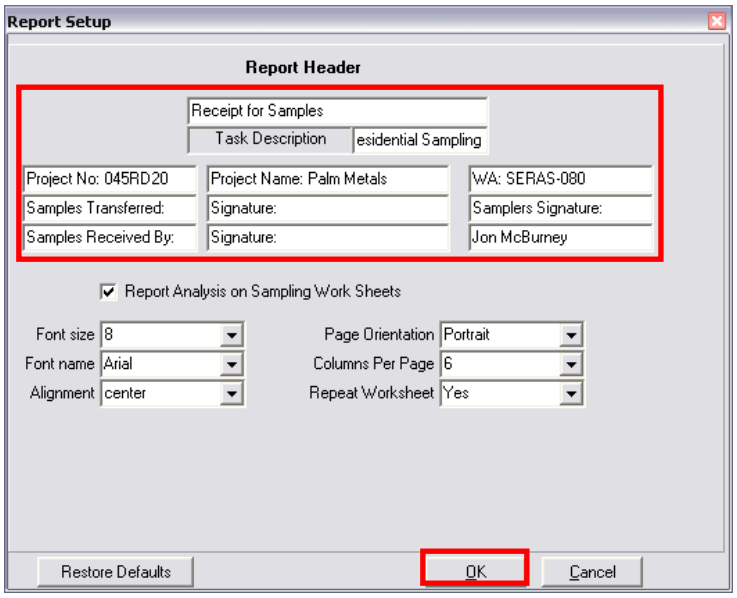
2. Click on the **'Print'** button on the top menu bar.

3. Select the **'Worksheet'** option.

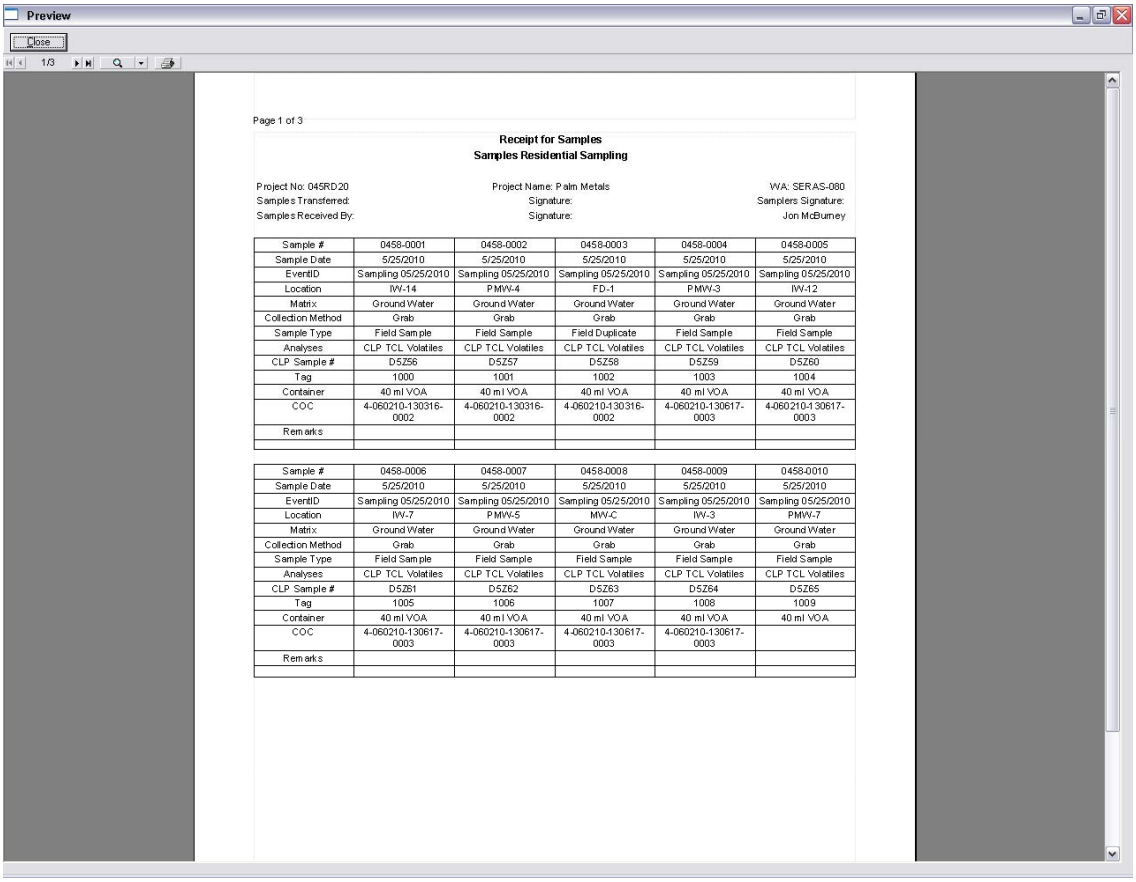
4. Select the **'Report Setup'** option to customize the Header. RTF and HTML will print the worksheet data to the selected format.



5. Configure the Report Header fields to reflect the information that will be displayed at the top of the report.



6. Click **'OK'** and the report is generated.



Sample #	0458-0001	0458-0002	0458-0003	0458-0004	0458-0005
Sample Date	5/25/2010	5/25/2010	5/25/2010	5/25/2010	5/25/2010
EventID	Sampling 05/25/2010	Sampling 05/25/2010	Sampling 05/25/2010	Sampling 05/25/2010	Sampling 05/25/2010
Location	IW-14	PMW-4	FD-1	PMW-3	IW-12
Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
Collection Method	Grab	Grab	Grab	Grab	Grab
Sample Type	Field Sample	Field Sample	Field Duplicate	Field Sample	Field Sample
Analyses	CLP TCL Volatiles	CLP TCL Volatiles	CLP TCL Volatiles	CLP TCL Volatiles	CLP TCL Volatiles
CLP Sample #	D5Z56	D5Z57	D5Z58	D5Z59	D5Z60
Tag	1000	1001	1002	1003	1004
Container	40 ml VOA	40 ml VOA	40 ml VOA	40 ml VOA	40 ml VOA
COC	4-060210-130316-0002	4-060210-130316-0002	4-060210-130316-0002	4-060210-130617-0003	4-060210-130617-0003
Remarks					

Sample #	0458-0006	0458-0007	0458-0008	0458-0009	0458-0010
Sample Date	5/25/2010	5/25/2010	5/25/2010	5/25/2010	5/25/2010
EventID	Sampling 05/25/2010	Sampling 05/25/2010	Sampling 05/25/2010	Sampling 05/25/2010	Sampling 05/25/2010
Location	IW-7	PMW-5	MW-C	IW-3	PMW-7
Matrix	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
Collection Method	Grab	Grab	Grab	Grab	Grab
Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
Analyses	CLP TCL Volatiles	CLP TCL Volatiles	CLP TCL Volatiles	CLP TCL Volatiles	CLP TCL Volatiles
CLP Sample #	D5Z61	D5Z62	D5Z63	D5Z64	D5Z65
Tag	1005	1006	1007	1008	1009
Container	40 ml VOA	40 ml VOA	40 ml VOA	40 ml VOA	40 ml VOA
COC	4-060210-130617-0003	4-060210-130617-0003	4-060210-130617-0003	4-060210-130617-0003	
Remarks					

Field Operating Procedure No. 6 Packing and Shipping of Environmental Samples

Old American Zinc Plant Superfund Site,
Fairmont City, St. Clair County, Illinois
Remedial Design
WA No. 224-RDRD-B5A1/Contract No. EP-S5-06-01

Revision Number: 0
Prepared: 3/10/2017

Approved By:

_____

Rachel Grand, Site Manager Date

_____

Theresa Rojas, Program Quality Manager Date

Packing and Shipping of Environmental Samples

1.1 Purpose

The purpose of this field operating procedure (FOP) is to delineate protocols for the packing and shipping of samples to the laboratory for analysis.

1.2 Scope

This FOP is applicable to all samples collected and prepared for analysis at an offsite laboratory.

1.3 Equipment and Materials

- Waterproof hard plastic coolers
- Plastic zip-top bags
- Plastic garbage bags
- Absorbent packing material (not vermiculite)
- Inert cushioning material (not vermiculite)
- Ice
- EPA Region 5 sample tags
- Scribe software
- Laptop and printer
- Adhesive labels 2 x 4 inches (generated by Scribe software)
- Chain-of-custody forms (generated by Scribe software)
- EPA Region 5 Custody seals
- Airbills and shipping pouches (e.g., FedEx)
- Clear tape
- Strapping tape
- Mailing labels

1.4 Procedures and Guidelines

1.4.1 Prepare Bottles or Bags for Shipment

1. Arrange sample containers in groups by sample number.
2. Check that sample container lids are tight.
3. Secure appropriate EPA Region 5 sample tags around lids of container with string or wire.
4. Arrange containers in front of assigned coolers.
5. Affix appropriate adhesive labels to each container.
6. Enclose each sample in a clear, resealable zip-top bag, making sure that sample labels are visible.

1.4.2 Prepare Coolers for Shipment

1. Tape drains shut, inside and out.
2. Affix “This Side UP” labels on all four sides and “Fragile” labels on at least two sides of each cooler.
3. Place mailing label with laboratory address on top of the coolers.
4. Place inert cushioning material (e.g., bubble wrap, preformed poly-foam liner) in the bottom of the cooler. Do not use vermiculite.
5. Place appropriate chain-of-custody records with corresponding custody seals on top of each cooler.
6. Double-bag and seal loose ice in resealable, plastic, zip-top bags to prevent melting ice from leaking and soaking the packing material. Place the ice outside the garbage bags containing the samples. Place sufficient ice in cooler to maintain the internal temperature at 4±2 degrees Celsius during transport.
7. Put an absorbent pad in the bottom of the cooler and fill the cooler with enough packing material to prevent breakage of the sample bottles and to absorb the entire volume of the liquid being shipped (offsite sample shipment only).
8. Record the EPA Region 5 custody seals on the chain-of-custody forms. Sign each chain-of-custody form (or obtain signature) and indicate the time and date the cooler was custody sealed.
9. Seal the laboratory copies of the chain-of-custody forms in a large resealable plastic zip-top bag and tape to the inside lid of the cooler. Retain the Region 5 copies of the chain-of-custody forms for return to EPA. Each cooler must contain a chain-of-custody form (or forms) that corresponds to the contents of the cooler.
10. Close lid and latch.
11. Peel custody seals carefully from backings and place intact over lid openings (right front and left back). Cover seals with clear protection tape.
12. Tape cooler shut on both ends, making several complete revolutions with strapping tape. **Do not** cover custody seals.
13. Relinquish to carrier (e.g., FedEx). Place airbill receipt inside the mailing envelope and send to sample documentation coordinator, along with the other documentation.

1.5 Attachments

None.

1.6 Key Checks

- Ensure completeness of the airbill.
- Verify that the shipment is not leaking from wet ice.

1.7 References

None.

Field Operating Procedure No. 7
Note Taking and Field Logbook

Old American Zinc Plant Superfund Site,
Fairmont City, St. Clair County, Illinois
Remedial Design
WA No. 224-RDRD-B5A1/Contract No. EP-S5-06-01

Revision Number: 0
Prepared: 3/10/2017

Approved By:

_____

Rachel Grand, Site Manager Date

_____

Theresa Rojas, Program Quality Manager Date

FIELD OPERATING PROCEDURE FOP-07

Note Taking and Field Logbook

1.1 Purpose

The purpose of this field operating procedure (FOP) is to delineate protocols for recording field and sampling information in a field logbook.

1.2 Scope

Data generated from the use of this FOP may be used to support the following activities: site characterization, remedial investigation, and predesign sampling.

1.3 Equipment and Materials

- Field logbook
- Indelible black ink pen
- Write-in-the-rain pen (for extreme weather conditions—cold/rain)

1.4 Procedures and Guidelines

All information pertinent to a field or sampling effort will be recorded in a bound field logbook that will be initiated at the start of the first onsite activity. The field logbook will consist of a bound notebook with consecutively numbered pages that cannot be removed. The outside front cover of the logbook will contain the project (site) name and the specific activity (e.g., supplemental remedial investigation). The inside front cover will include the following:

- Site name and EPA work assignment number
- Project number
- Site manager's name and mailing address
- Sequential logbook number
- Start date and end date of logbook

Each page will be consecutively numbered, dated, and initialed. All entries will be made in indelible black ink, and all corrections will consist of line-out deletions that are initialed and dated. If only part of a page is used, then the remainder of the page should have an "X" drawn across it. At a minimum, entries in the logbook will include the following:

- Time of arrival and departure of site personnel, site visitors, and equipment
- Instrument calibration information, including make, model, and serial number of the equipment calibrated
- Description of significant activities for the day
- Documentation of photographs taken during field activities (e.g., date, time, and description of photograph)
- Field observations (e.g., sample description, weather, unusual site conditions or observations, sources of potential contamination, etc.)
- Detailed description of the sampling location, including a sketch when necessary

- Details of the sample site (e.g., coordinates [x, y], water elevation [z], casing diameter and depth, integrity of the casing, etc.)
- Sampling methodology and matrix, including distinction between grab and composite samples
- Names of field team members and subcontractors
- Start or completion time of sample collection activities
- Field measurements (e.g., water depths, sediment probe depths)
- Type of sample (e.g., sediment, groundwater, surface water, soil, debris)
- Number, depth, and volume of sample collected
- Field sample number
- Requested analytical determinations
- Sample preservation
- Quality control samples associated with the sample
- Sample shipment information including chain-of-custody form number and laboratory, carrier, date, and time
- Health and safety issues (including level of personal protective equipment)
- Signature and date by personnel responsible for observations

Sampling situations vary widely. No general rules can specify the extent of information that must be entered in a logbook. However, records should contain sufficient information so that someone can reconstruct the sampling activity without relying on the collector's memory. The field team leader will keep a master list of all field logbooks assigned to the sampling crew.

1.5 Attachments

None.

1.6 Key Checks and Items

None.

Field Operating Procedure No. 8
Equipment Decontamination Procedures

Old American Zinc Plant Superfund Site,
Fairmont City, St. Clair County, Illinois
Remedial Design
WA No. 224-RDRD-B5A1/Contract No. EP-S5-06-01

Revision Number: 0
Prepared: 3/10/2017

Approved By:

_____

Rachel Grand, Site Manager Date

_____

Theresa Rojas, Program Quality Manager Date

Equipment Decontamination Procedures

1.1 Purpose

This field operating procedure (FOP) provides updated guidelines for the equipment decontamination procedures to be implemented during soil sampling at the Old American Zinc Plant Superfund site in Fairmont, Illinois.

1.2 Equipment and Materials

- Distilled water
- Liquinox detergent
- Two 1-gallon sprayers (1 filled with distilled water, 1 filled with 1 percent Liquinox solution)
- Nitrile gloves
- Paper towels

1.3 Procedure: Sampling Equipment Decontamination—Hand Augers, Trowels, and Drill Rig Core Barrels

Decontamination procedures will be conducted in accordance with the following guidelines:

1. Wear unpowdered chemical-resistant nitrile gloves.
2. Make a solution of approximately **1 gallon** of distilled water and **2.5 tablespoons of Liquinox** (for 1 percent solution) in a 1½-gallon sprayer.
3. Remove gross contamination from the sampling tool at site of sampling (sample hole).
4. After **each** sample is collected (from each aliquot in one sample area/ depth), the sampling tool will be decontaminated using a spray bottle of Liquinox solution. After gross contamination is removed, liberally spray the sampling tool with the solution over the ground surface. The overspray can be allowed to disperse into the yard onto the grassy or soil surface. **Do not spray over the sampling borehole location.** Spray the sampling tool (inside and out) and handle (i.e., any surfaces that came into contact with the potentially contaminated soil)**.**
5. Prior to rinsing, use a clean paper towel to wipe off excess dirt and soapy spray. Discard used paper towels with other used sampling equipment and personal protective equipment.
6. Rinse the sampling tool using the clean distilled water spray. The overspray can be allowed to disperse into the yard onto the grassy or soil surface. Do not spray over the sampling borehole location.
7. Completely air dry the sampling tool or wipe dry with a clean paper towel.
8. For **each property,** document decontamination by indicating the decontamination was conducted in accordance with this FOP.

Note: If residents have questions regarding the overspray procedure, inform them that the Liquinox (and Liquinox solution) is a biodegradable, phosphate-free detergent and should not adversely affect their grass. Liquinox safety data sheet is available and attached to this document.

1.4 Attachments

Liquinox Safety Data Sheet.

1.5 Key Checks

1. Do not use acetone for decontamination.
2. Clean with solutions of Liquinox or equivalent phosphate-free detergent, and distilled water.

1.6 References

None.

ALCONOX

Critical-cleaning detergents for laboratory, healthcare and industrial applications

30 Glenn Street
White Plains NY 10603 USA
Tel.914.948.4040
Fax.914.948.4088
Toll Free 877-877-2526

24 Hour Emergency Number (CHEM-TEL) (800) 255-3924 in US or ++813-248-0513

(e-mail) cleaning@alconox.com

(URL) http://www.alconox.com
- **distributors**
- **technical information**
- **free samples**
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Liquinox®

Critical-Cleaning Liquid Detergent

- Concentrated to save you money
- Replaces corrosive acids and hazardous solvents
- Phosphate free, biodegradable and readily disposable
- Free rinsing to give you reliable results and no interfering residues
- Use to pass your cleaning validation tests for lab accreditation and plant inspection approval

Used to clean: Healthcare instruments, laboratory ware, vacuum equipment, tissue culture ware, personal protective equipment, sampling apparatus, catheters, tubing, wine glasses, clean rooms, medical devices, optical parts, electronic components, pharmaceutical apparatus, cosmetics manufacturing equipment, metal castings, forgings and stampings, industrial parts, pipes, tanks and reactors. Authorized by USDA for use in federally inspected meat and poultry plants. Passes inhibitory residue test for water analysis. Used for phosphate sensitive analysis ware. FDA certified.

Used to remove: Soil, grit, grime, slime, grease, oils, blood, tissue, particulates, deposits, chemical and solvents.

Surfaces cleaned: Corrosion inhibited formulation recommended for glass, metal, stainless steel, porcelain, ceramic, plastic, cement and fiber glass. Can be used on soft metals such as copper, aluminum, zinc and magnesium if rinsed promptly. Used for art restoration. Corrosion testing may be advisable.

Cleaning method: Soak, brush, sponge, cloth, ultrasonic, flow through clean-in-place. Will foam—not for spray or machine use.

Directions: Make a fresh 1% solution (2 1/2 Tbsp. per gal., 1 1/4 oz. per gal. or 10 ml per liter) in cold, warm or hot water. If available, use warm water. Use cold water for blood stains. For difficult soils, raise water temperature and use more detergent. Clean by soak, circulate, wipe or ultrasonic method. Not for spray machines, will foam. RINSE THOROUGHLY—preferably with running water. For critical cleaning, do final or all rinsing in distilled, deionized or purified water. For food contact surfaces, rinse with potable water. Used on a wide range of glass, ceramic, plastic and metal surfaces. Corrosion testing may be advisable.

Available in convenient sizes:	**Alconox Catalog #**
Case 12 x 1 quarts	**1232**
Case of 4 x 1 gallons	**1201**
15 gallon drum	**1215**
30 gallon drum	**1230**
55 gallon drum	**1255**
1 gallon of concentrate makes 100 gallons of cleaning solution	

Liquinox is available from leading laboratory, hospital, clinical and industrial suppliers. To find a distributor for Alconox, Inc. detergents, visit “Find Dealer” at the website. To request FREE samples, visit Sample Request at www .alconox.com, write or call Alconox, Inc. today

MS 02.40.01.16.98.1

Critical-cleaning detergents for laboratory, healthcare and industrial applications

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(e-mail) cleaning@alconox.com

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PHYSICAL DATA	Typical Value
pH as is	8.5
Specific gravity (g/ml)	1.07
Density (lbs./gal.)	8.9
Vapor pressure (mm Hg)	10.5
Flash Point (degrees F)	None
Phosphate Content (as Phosphorus)	0%
Fragrance and Dye Content	0%
Color:	Pale Yellow
Form:	Liquid
Solubility in Water:	Completely soluble in all preparations
Hard Water Effectiveness:	Highly Effective
Biodegradability:	Biodegradable
Foam Tendency:	High Foaming
Shelf Life:	Two years from month of manufacture

Chemical Description

Liquinox consists primarily of a homogeneous blend of sodium linear alkylaryl sulfonate, sodium xylene sulfonate, and ethoxylated alcohol. Liquinox is anionic in nature.

Cleaning Validation Methods:

Test a parameter of rinse water before and after rinsing the cleaned surface, or test the clean surface. No significant change in the parameter indicates no detectable residue. Parameters measured include: pH, conductivity, UV, TOC, HPLC, sodium concentration, phosphorus concentration, anionic surfactant concentration using inexpensive detergent water testing kits, surface tension, and surface analysis. For details see the Pharmaceutical Cleaning Validation References at www.alconox.com

Health Safety Information:

OSHA Hazardous Ingredients: None
RCRA Hazard Class: Non-hazardous
RoHS: No RoHS hazardous ingredients
EPA Priority Pollutants: None
DOT Hazard Class: Non-hazardous
Flammability: Non-flammable
Latex Content: None in detergent, packaging materials or adhesives.
Oral Toxicity: LD_{50} >5000 mg/kg (Rat, Oral)
Eye Irritation: Mild to Moderate eye irritant if not rinsed
Inhalation Toxicity: Non-irritating
VOC Content: 0%
Carcinogenicity: NTP = No **IARC** = No **OSHA** = No
All ingredients in Liquinox are listed in TSCA inventory.
Precautions:
No special precautions other than good industrial hygiene and safety practices employed with any industrial chemical (see Directions). A Material Safety Data Sheet is available at www.alconox.com or by calling 914-948-4040 and asking for the SDS. prompts. The Liquinox catalog number starts with 12.
Contact Alconox, Inc. for purchase specifications. Information presented is typical. Not to be taken as specifications. Typical data is not a specification